Statistics Report – DEA Budget

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The purpose of our project was to determine the percentage of the Drug Enforcement Administration's (DEA) budget that is being spent on drug enforcement is unnecessary. Basically, when looking at the available data on drug usage, we will prove that the constant increase in the Drug Enforcement Administration's budget is not making a positive impact for the Drug Enforcement Administration.

The Drug Enforcement Administration is the law enforcement agency under the United States Department of Justice. The mission of the Drug Enforcement Administration is to enforce the controlled substance laws and regulations of the United States. They aim to bring to the United States criminal and civil justice system those organizations and members involved in the growing, manufacture, or distribution of controlled substances. These organizations and members participate in illicit traffic within the United States. Additionally, the Drug Enforcement Administration recommends and supports non-enforcement programs aimed at reducing the availability of illicit controlled substances on both the domestic and international markets.

The Drug Enforcement Administration focuses on drug smuggling and usage within the United States. They are the leading agency for domestic enforcement. Their focus is not only within the United States borders, but they also coordinate and pursue United States drug investigations abroad. The current budget for the Drug Enforcement Administration is $2,602 Million. This is split up amongst the various categories. The budget of the Drug Enforcement Administration is constantly increasing every year, as well as the percentage focused specifically on drug enforcement.   With the decline of the economy, we also wanted to take a look at the Drug Enforcement Administration's employment situation. The current total amount of employees is 10,784. Of these, they have employed 5,233 special agents, and employed 5,551 members of their support staff.

Along with the budget of the Drug Enforcement Administration, we researched various drugs and their use. Drug usage is considered using a non-harmful dosage of a substance recreationally. The drug is used with the intention of creating or enhancing a recreational experience. The substance is used with an eliminated risk of negatively affecting other aspects of one's life. Contrarily, drug abuse is considered using a substance in a harmful dosage. This sort of substance abuse can lead to negative impacts on one's life, and often is used with the intent of surpassing any non-harmful dosage of the drug.

The first drug we focused on was cocaine. Cocaine is an extremely powerful and addictive stimulant that directly affects the brain. This is one of the oldest drugs that are known. This substance has been abused for over 100 years. However, the source of cocaine, the coca leaves, has been used for thousands and thousands of years.

Heroine is the second drug we researched. It is a highly addictive and extremely rapid acting opiate. Morphine is the principal component of the naturally occurring substance opium, of which heroine is derived. Heroine can be injected, snorted, and smoked. The color of heroine in the eastern United States is typically white, where in the western United States heroine is generally black or brown.

Marijuana is another drug that we researched for this report. Marijuana is a mind-altering substance that is produced from a plant. The scientific name for this plant is Cannabis Sativa. The active chemical found in marijuana, THC or Tetrahydrocannabinol, induces relaxation and heightening of the senses. It is generally dried, shredded leaves, stems, seeds and flowers. The color is typically green, brown or gray, although it has been said to be blue, purple, and a few other colors. The lower quality contains all parts, whereas the higher quality contains the bud and flowering top.

Methamphetamines are synthetic stimulants that are highly addictive. It produces euphoric effects, and an extremely strong sense of well-being. This typically lasts for about 24 hours. Methamphetamines are generally inexpensive, and relatively easy to produce. It is typically found in crystallized or rock-like chunks, and a variety of colors, including white, yellow, brown, gray, orange, and pink.

Hallucinogens are substances that produce profound distortions in a person's perception of reality. People claim to see images, hear sounds, and feel sensations that seem real, but do not exist. They can cause emotions to swing wildly and real-world sensations appear to assume unreal, and often frightening aspects. LSD, or Lysergic acid diethylamide, is the most widely used in this class of drugs. Hallucinogens have been around for thousands of years, from the Arctic to the Tropic regions.

To determine the trends of drug use, we decided to use data collected by the Monitoring our Future study. This was the most extensive data we could find covering the years 1991 - 2008. The data is split into 5 age groups conveying the percentages of those populations that have tried the drug in the month the survey was taken. The five age groups are 8th grade, 10th grade, 12th grade, college, and young adult (age 24-28). The monthly data was preferable as this was a better indicator of the more frequent drug users. We did observe the trends of other smaller datasets, but all of them confirmed the data of the Monitoring our Future report.

For this study, we decided to look at five different drugs used since 1991. The five drugs are marijuana, cocaine, crack, heroin, and hallucinogens. We chose these as they have been the ones stressed the most throughout our childhood, so we suspect they will have the strongest influence on the DEA budget. Throughout the roughly 20 years, we see a polynomial of degree 2 trend, peaking around the year 2000. This occurs in all of the datasets except for young adults, which sees an increasing trend of drug use throughout the time period studied. Furthermore, we see an outlier in the year 1996 where each age group has much higher drug use than expected. We could not find an explanation for this, although this year proved to be fishy in some data sets. We decided to treat it as an outlier and use the general trend that the rest of the data exhibited.

The most important information gathered from the drug use data was not general trend, but rather the influence that each of the five drugs had on the trends of use. To determine how well the DEA uses their budget, we must know what drugs have the strongest impact on drug use.

First, we observed the eighth grade data. The graphs of the five drugs we studied vs. total eighth grade drug use as well as the boxplot of each drug can be seen in the appendix. The boxplots show that marijuana use amongst eighth graders trumped the other drugs, with hallucinogens pulling a far second. Running an anova on a linear model using all 5 as predictors, we can see that marijuanna is the most significant, followed by heroin, then the barely significant hallucinogens. The impact of each drug was investigated further, the results of which can be located in the appendix. As anticipated, marijuana shows a correlation of above .95 with all drugs. Cocaine alone with all drugs created a linear model with an R-squared of .7684 and a correlation of .884. Crack performed similar, expect with a lower R-squared. Hallucinogens and heroin both performed well with a high R-squared and correlation around .89. The linear model using all five drugs as predictors came up with, as expected, incredibly good predictive power. Based on the anova results, we tried to eliminate those drugs found to be insignificant, namely crack and cocaine. The new model had an R-squared value that was nearly identical to the larger model, however heroin was insignificant in this model. After removing it, the new model had an even better R-squared value of .9736 using only marijuana and hallucinogens, both of which prove to be significant in this model. From this, we can conclude that marijuana and hallucinogens had the strongest effect on eighth grade drug use.

Next, we observed the tenth grade data. All of the corresponding data and graphs can be found in the appendix. The boxplots for tenth grade appear to be similar to the eighth grade boxplots, however the variance in the main drugs besides marijuana is less than in the eighth grade. As before, we ran the anova using all drugs as predictors, and determined that marijuana again was the main predictor, with crack and hallucinogens also showing significance. To confirm this we again tested each drug individually versus the total drug use. Marijuana has a correlation of over .99 and a linear model that almost perfectly reflected overall drug use. Cocaine did not do as well showing a correlation around .85 and an R-squared of .7036. Crack was a couple hundreds lower than cocaine on both values. Hallucinogens showed an incredibly poor R-squared of a mere .33 and a correlation coefficient of .609. Finally, heroin showed slightly better results than hallucinogens with an R-squared of .44 and a correlation of .688. Hallucinogens had much lower results than were expected from the anova results. We tested a linear model using only marijuana, crack, and hallucinogens, and found that this was a good predictor with an R-squared of .9942 versus the .9964 of all the five drugs together. However, in this model, crack showed to be insignificant and hallucinogens just barely significant. Furthermore, the value inflation factors show that multicollinearity is not a reason for this. Removing crack increased the R-squared and made hallucinogens more significant, while removing both crack and hallucinogens or just hallucinogens proved to be a detriment to the model. From this we concluded that, similar to the eighth graders, marijuana and hallucinogens were the most significant drugs used.

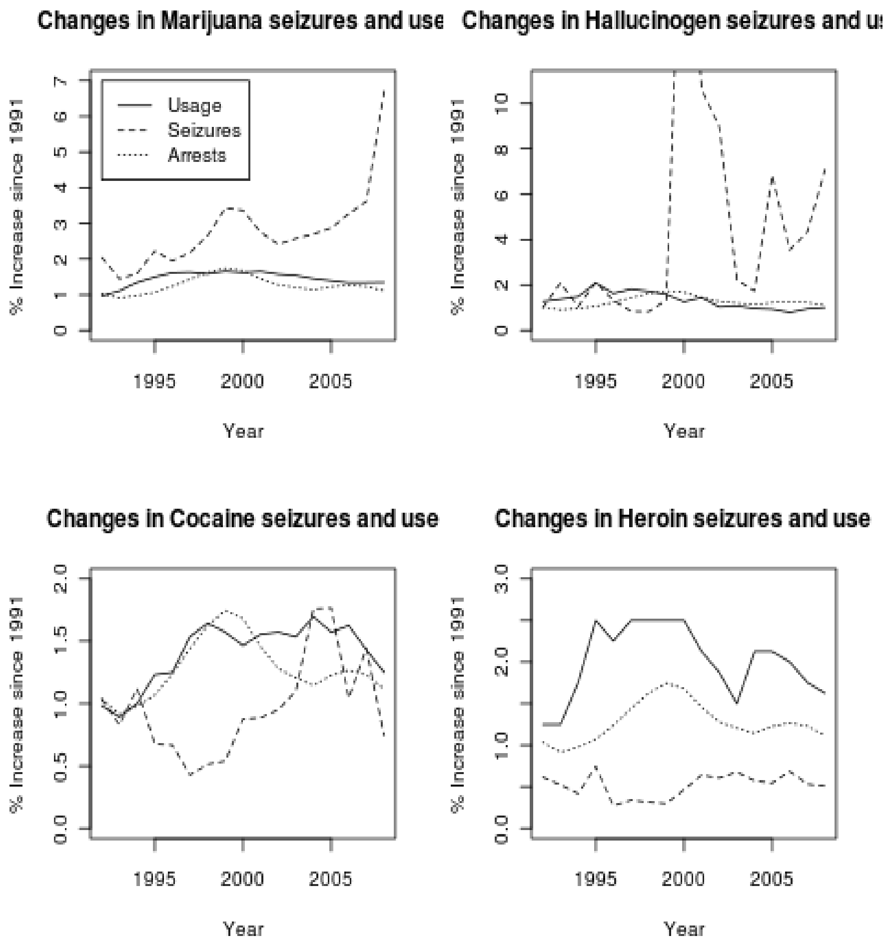
The twelfth grade data at first seemed only slightly different from the tenth grade data. The boxplots show a relatively similar mean for the different drugs, however the variance for twelfth grade appears to be much less than that of the tenth grade data. The biggest change came from the anova, which indicated that all the variables were significant except heroin. As in the other two datasets, we investigated each drug further. Again, marijuana proved to be an excellent indicator of total drug use with a high correlation and R-squared value. Cocaine showed a much lower R-squared of only .5995 and a correlation of .789. This is still good enough to justify its significance from the anova. Crack resulted in both a higher correlation (.8709) and a higher R-squared (.7434), again justified by the anova test. Hallucinogens had surprisingly low results, posting an R-squared of only .1463 and a correlation of .4433. This was much lower than expected, and would be investigated further when making the final linear model. Finally, heroin showed unexpected numbers with a correlation of .7444 and an R-squared of .5263, much higher than expected given that the anova reported this variable to be insignificant. Creating a linear model using all five drugs as predictors confirmed that heroin was insignificant, despite its correlation with total drug use. We ran a value inflation factor test on the model, and nothing suspicious showed up, so we tried a model excluding heroin. The new model had a higher R-squared, yet it showed that cocaine was not a significant variable, so we tried another model excluding cocaine. In the new model, the R-squared dropped by .0005, but all the variables prove to be significant, so we concluded that this would be our best twelfth grade model. From this, we gathered that the most significant drugs used by twelfth graders are marijuana, hallucinogens, and crack.

The college data was the next dataset we looked at. From the boxplots, this seemed similar to the other data seen thus far. Heroin seemed a little lower than expected, but as usual, marijuana has the highest average, with hallucinogens pulling a distance second. The anova results were different than in the past datasets, showing only marijuana and cocaine to be significant. As before, we tested each drug versus the total drug use. Marijuana, although still highly significant, showed less impressive results than before. For the first time it has an R-squared value less than .90, although it is not far behind that with .899. Also, the correlation is only .9513, much lower than in the past datasets. Cocaine for a significant variable also has less impressive results than expected with an R-squared value of .4758 and a correlation of .7117. The results for crack fit the anova with a incredibly low R-squared of .1433 and a correlation of only .4401. Hallucinogens, for the first time, have an R-squared that is barely greater than zero and a negative correlation with magnitude .2723. Heroin has a similar R-squared to hallucinogens barely reaching above zero, yet the correlation coefficient has a low, but not negative, value of .3441. The linear regression using all variables confirmed the anova results reporting that only marijuana and cocaine are significant. We adjusted the linear model accordingly. Using only marijuana and cocaine as predictors, the linear model increased its R-squared value by .0006, and both the variables prove to be highly significant. From this, we can conclude that the strongest indicators of college drug use are marijuana and cocaine.

Finally, we tested the data for young adults. This time, we notice a significant difference in data. The trend of drug use versus year alone shows that this data does not move like the other datasets. However, we still decided to find which of the five chosen drugs were the best predictors of drug use. The boxplots show that marijuana, as in every other dataset, has an average well above the other drugs. The difference appears in the second boxplot, showing that the average of cocaine surpasses that of hallucinogens. This was further supported by the anova, which reported that the two most significant drugs for this age group are marijuana and cocaine. As before, we investigated each drug individually. Marijuana, again highly significant, showed an even lower R-squared than the college age group at a mere .883 with a corresponding correlation of .9433. Cocaine reported an R-squared of .5701 and a correlation of .7716. This is not great, but enough at this stage to justify its stance as a significant variable. Crack had both a negative R-squared and a negative correlation with a magnitude hovering around zero. Hallucinogens had the most surprising results with an R-squared of .4012, but a correlation of -.6606. Lastly, heroin showed a positive correlation of .2507, yet it had an R-squared of only .0043. These results, although much different than previous datasets, confirm the findings of the anova. We tested a linear model using all five variables as predictors, then we tried using only the two significant variables, marijuana and cocaine. The latter model had an R-squared decreased by .001, yet the two remaining variables proved substantially more significant. From this, we concluded that the two best indicators of young adult drug use were marijuana and cocaine.

Based on the datasets for the five age groups we were able to determine that marijuana was all around the best indicator of drug use. Hallucinogens and cocaine also appeared to be predictors of drug use, but for different age groups. Hallucinogens was more prevalent in the in the eighth, tenth and twelfth grade, while cocaine weighed more heavily in the college and young adult datasets. Surprisingly, both crack and heroin seemed to have no bearing on the change in drug use since 1991. At this point it seemed appropriate to investigate the relationship between drug use and DEA budget. For this, we compared the average drug use with the DEA budget between 1991 - 2008. Based on the plot of average drug use versus budget, we can see that the relationship is certainly not linear. In fact, it appears that after the drug use peak around 2000, the budget continued to increase while drug use decreased for eight consecutive years. Running a Pearson's correlation test on the budget versus average drug use showed that there was little correlation between the two, resulting in a coefficient of only .307. Next, we tried making a linear model using the average drug use to predict the DEA budget. This resulted in a failed model with an R-squared of only .037 without the average drug use as a significant variable.

The next question we investigated was whether either of the three most prevalent drugs were good predictors of the DEA budget. First, we ran an anova using budget as a response and marijuana, hallucinogens, and cocaine as predictors. The results showed that hallucinogens were the only one of those drugs that was significant in the model. Furthermore, this linear model had an R-squared value of .6903. We then ran an anova using all five drugs as predictors of the DEA budget to see if this would yield anything different than expected. The new model projected that marijuana, hallucinogens and crack were the most significant variables, and the model had a higher R-squared of .786. The results of the bigger model seemed odd, so we plotted the necessary graphs of the linear model to perform basic diagnostics on the data, as can be seen in the appendix. Interestingly, the plots showed no signs of anything unusual. There is one outlier apparent, but the Normal Q-Q plot is as expected, and the residuals vs. fitted plot is randomly distributed about the horizontal. From this, we concluded that the DEA budget since 1991 has had little to no relationship with the trends in drug use.



The graphs show various comparisons of drug use, arrests, and seizures made by the DEA. Each graph shows, for an individual drug, how much was seized, and how much was used, as a factor of use in 1991 (so a value of 1 means the same amount as 1991). Every graph also includes the change in the total number of arrests made by the DEA. A very noticeable theme across each graph is the similarity between the curves describing arrests and use, and the relative contrast between usage and seizures. This leads us to believe that there is a strong correlation between arrests and drug use, this we will follow up on later. For now we will analyze the relationship between the individual drug use and drug seizures.

Simple linear regression analysis on the effect of seizures on drug usage shows no significance with any drug other than heroin. At this point we introduce the idea that the effects of the DEA's actions may not be immediately visible, and extend further regression analysis to consider this fact. We do this by performing regressions with the independent variables “lagged” by a year or two, implying that the effects aren't felt for one or two years. This analysis shows significance for Marijuana, showing some significance at one year, and even more at 2 years, however it is questionable whether 2 years is a reasonable assumption for effects on drug trafficking. Hallucinogens and Cocaine were found to have no significant relationship between seizures and use, possibly because of the erratic nature of the amounts seized. The only significant relationship was found to be the effect of heroin seizures on heroin use.

Marijuana

```
> summary(aov(Marijuana ~ (arrests*weed_kg)))
                Df Sum Sq Mean Sq F value    Pr(>F)
arrests          1 50.733  50.733 22.6961 0.0003023 ***
weed_kg          1  0.073   0.073  0.0326 0.8593503
arrests:weed_kg  1 10.707  10.707  4.7900 0.0460741 *
Residuals       14 31.294   2.235
---
> summary(aov(Marijuana ~ (weed_kg*arrests)))
                Df Sum Sq Mean Sq F value   Pr(>F)
weed_kg          1  4.814   4.814  2.1535 0.164352
arrests          1 45.992  45.992 20.5752 0.000466 ***
weed_kg:arrests  1 10.707  10.707  4.7900 0.046074 *
Residuals       14 31.294   2.235
---
```

Hallucinogens

```
> summary(aov(Hallucinogens ~ (arrests*hall_doses)))
                   Df  Sum Sq Mean Sq F value Pr(>F)
arrests             1 0.23688 0.23688  1.0672 0.3191
hall_doses          1 0.54424 0.54424  2.4519 0.1397
arrests:hall_doses  1 0.36457 0.36457  1.6424 0.2208
Residuals          14 3.10756 0.22197
---
> summary(aov(Hallucinogens ~ (hall_doses*arrests)))
                   Df  Sum Sq Mean Sq F value Pr(>F)
hall_doses          1 0.22071 0.22071  0.9943 0.3356
arrests             1 0.56041 0.56041  2.5247 0.1344
hall_doses:arrests  1 0.36457 0.36457  1.6424 0.2208
Residuals          14 3.10756 0.22197
---
```

Cocaine

```
> summary(aov(Cocaine ~ (arrests*coke_kg)))
                Df  Sum Sq Mean Sq F value    Pr(>F)
arrests          1 0.70242 0.70242 20.0301 0.0005232 ***
coke_kg          1 0.26809 0.26809  7.6449 0.0151922 *
arrests:coke_kg  1 0.00273 0.00273  0.0779 0.7842360
Residuals       14 0.49095 0.03507
---
> summary(aov(Cocaine ~ (coke_kg*arrests)))
                Df  Sum Sq Mean Sq F value    Pr(>F)
coke_kg          1 0.02831 0.02831  0.8074 0.3840964
arrests          1 0.94220 0.94220 26.8677 0.0001387 ***
coke_kg:arrests  1 0.00273 0.00273  0.0779 0.7842360
Residuals       14 0.49095 0.03507
---
```

Heroin

```
> summary(aov(Heroin ~ (arrests*heroin_kg)))
                  Df   Sum Sq  Mean Sq F value    Pr(>F)
arrests            1 0.054839 0.054839 19.0023 0.000654 ***
heroin_kg          1 0.005481 0.005481  1.8993 0.1897873
arrests:heroin_kg  1 0.000987 0.000987  0.3421 0.5679441
Residuals         14 0.040403 0.002886
---
> summary(aov(Heroin ~ (heroin_kg*arrests)))
                  Df   Sum Sq  Mean Sq F value   Pr(>F)
heroin_kg          1 0.033398 0.033398 11.5728 0.004297 **
arrests            1 0.026922 0.026922  9.3288 0.008576 **
heroin_kg:arrests  1 0.000987 0.000987  0.3421 0.567944
Residuals         14 0.040403 0.002886
---
```

Our next action is to add arrests to the equation, and see how they play into changes in drug use. We performed various ANOVA tests and regressions with different variables in order to find out which of our factors (arrests/seizures) most influenced drug use. Some of those tests, which best represent our overall findings for this section, are shown above. We'll start off by taking a look at Hallucinogens. We see that again there is no significance shown by the ANOVA tests, and further analysis brought the same conclusion we had before: the seizures of hallucinogens are simply too erratic to be useful to our analysis.

Linear regressions models of use vs arrests however turned up that arrests showed a significant impact on hallucinogen use one to two years down the line, showing up to .49 adjusted R-squared explaining power.

We next turned our focus to Heroin, the only drug showing any impact from DEA seizures. The section to the side shows the model we found for controlling heroin use, and displays the method used for finding “lagged” effects, which we employed for all analysis of effects on drug use. The same set of tests showed that both arrests and seizures play an important part in regulating heroin use, with a very high significance. Next both marijuana and coke were modeled in the same way, however the best fitting models did not include seizures. Instead the best models for each of them was purely based on arrests. This leads us to believe that it is arrests that have a major impact on drug use, and that seizures are simply too small in the scope of international drug trade to make any reasonable effect on use for the average person. This leads into our final analysis.

```
> summary(dyn$lm(ts(Heroin) ~ lag(ts(arrests),1) * lag(ts(heroin_kg),0)))

Call:
lm(formula = dyn(ts(Heroin) ~ lag(ts(arrests), 1) * lag(ts(heroin_kg),
    0)))

Residuals:
      Min        1Q    Median        3Q       Max
-0.041853 -0.011611 -0.001775  0.008588  0.061725

Coefficients:
                                         Estimate Std. Error t value
(Intercept)                             5.075e-01  1.140e-01   4.451
lag(ts(arrests), 1)                    -6.841e-06  3.617e-06  -1.891
lag(ts(heroin_kg), 0)                  -1.106e-03  2.034e-04  -5.439
lag(ts(arrests), 1):lag(ts(heroin_kg), 0)  3.900e-08  7.173e-09   5.438
                                        Pr(>|t|)
(Intercept)                             0.000653 ***
lag(ts(arrests), 1)                     0.081099 .
lag(ts(heroin_kg), 0)                   0.000113 ***
lag(ts(arrests), 1):lag(ts(heroin_kg), 0) 0.000114 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.02541 on 13 degrees of freedom
  (2 observations deleted due to missingness)
Multiple R-squared: 0.9151,	Adjusted R-squared: 0.8955
F-statistic:  46.7 on 3 and 13 DF,  p-value: 3.193e-07
```

We concluded that, based on the data we have analyzed, arrests were the most significant contributor to controlling drug use on the part of the DEA. Therefore, there should also be a significant relationship between the number of arrests made and the amount of resources put into the DEA (i.e. budget and/or employees). Initial analysis over the full range of data from 1991 to 2009 showed no signs of a significant relationship between the three, which was very surprising, one would expect at least some significance in that respect. We decided to take the analysis a step further based on some of the discrepancies occurring in the data around '99-'01.

This led us to partition the data into two separate sets for analysis: one set is composed of data up to and including 1999, the other set having data post-1999. The same regression tests were performed on the individual sets, comparing arrests to employees and budget. What we found was a highly significant positive impact of budget and employees on the number of arrests made prior to 1999. This is what we would expect to see: more budget, which means more arrests, which means less drugs being done. However, when we analyze the post-99 data in the same way, we see the opposite. After 1999, there is a significant negative correlation between arrests and resources.

Pre-99

```
> summary(dyn$lm(ts(arrests) ~ budget, data=pre99))

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -6054.970   2630.088  -2.302   0.0548 .
budget         32.144      2.366  13.583 2.76e-06 ***
---

Residual standard error: 1476 on 7 degrees of freedom
Multiple R-squared: 0.9634, Adjusted R-squared: 0.9582
F-statistic: 184.5 on 1 and 7 DF,  p-value: 2.757e-06

> summary(dyn$lm(ts(arrests) ~ lag(ts(employees),1),
data=pre99))

Coefficients:
                         Estimate Std. Error t value Pr(>|
t|)
(Intercept)            -3.773e+04  3.516e+03  -10.73 3.87e-05
***
lag(ts(employees), 1)  8.458e+00  4.542e-01   18.62 1.55e-
06 ***
---

Residual standard error: 839.3 on 6 degrees of freedom
  (2 observations deleted due to missingness)
Multiple R-squared: 0.983,  Adjusted R-squared: 0.9802
F-statistic: 346.7 on 1 and 6 DF,  p-value: 1.548e-06
```

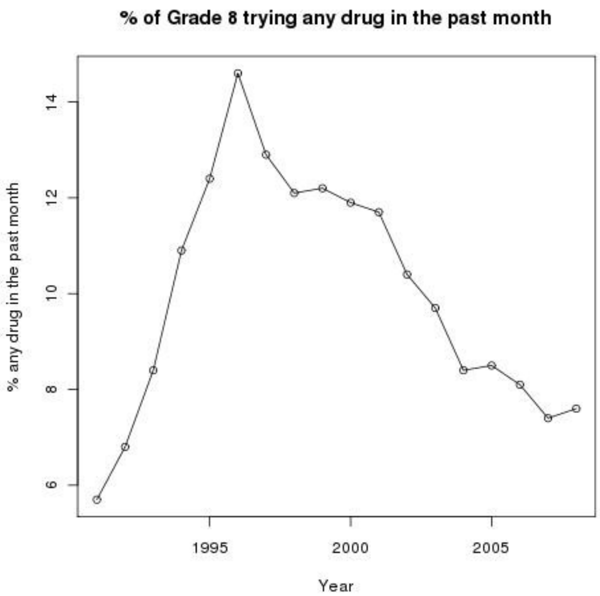
Post-99

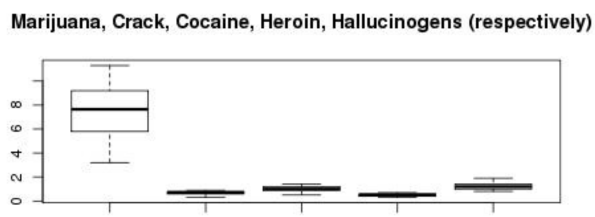
```
> summary(dyn$lm(ts(arrests) ~ budget, data=post99))

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 56557.511   6087.777   9.290 1.47e-05 ***
budget        -12.649      3.044  -4.155  0.00319 **
---

Residual standard error: 3099 on 8 degrees of freedom
Multiple R-squared: 0.6834, Adjusted R-squared: 0.6438
F-statistic: 17.27 on 1 and 8 DF,  p-value: 0.003185

> summary(dyn$lm(ts(arrests) ~ lag(ts(employees),1),
data=post99))

Coefficients:
                        Estimate Std. Error t value Pr(>|t|)
(Intercept)            93019.104  11782.068   7.895 9.92e-05
***
lag(ts(employees), 1)     -5.996      1.158  -5.178  0.00128
**
---

Residual standard error: 2510 on 7 degrees of freedom
  (2 observations deleted due to missingness)
Multiple R-squared: 0.793,  Adjusted R-squared: 0.7634
F-statistic: 26.81 on 1 and 7 DF,  p-value: 0.001284
```

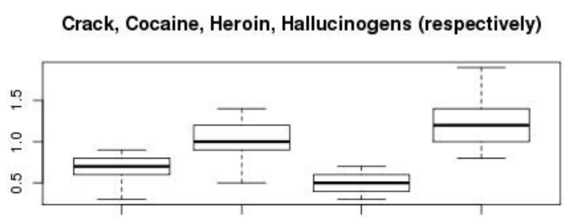
We have concluded that arrests have been the most significant factor in reducing drug use in the past 20 years. However within the past 10 years instead of making more arrests with their resources, the DEA has in fact been making less, yet they are still being given a constant increase in budget each year. Seizures of drugs, which we found to be generally insignificant in reducing drug use, have also dropped in that past 5 years overall. The only increase has been in marijuana seizures, the legal status of which has been under debate for some time. Our final conclusion is that the DEA has been ineffective in their use of resources, and are wrongfully being given a constant budget increase each year.

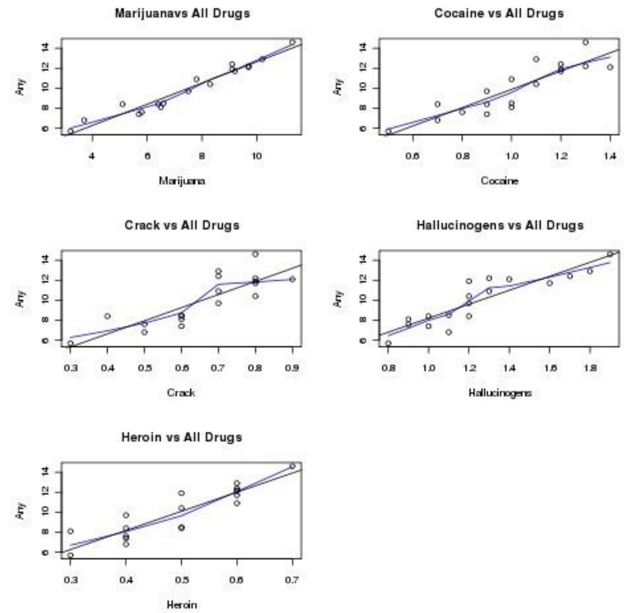
APPENDIX - TABLES

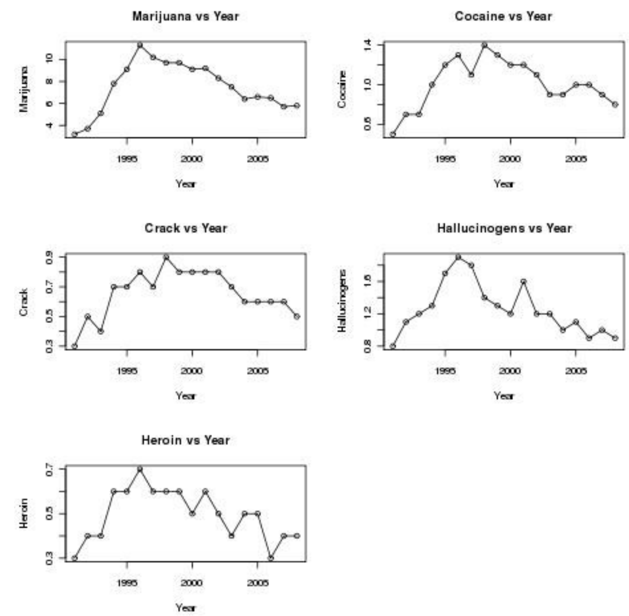
Eighth Grade



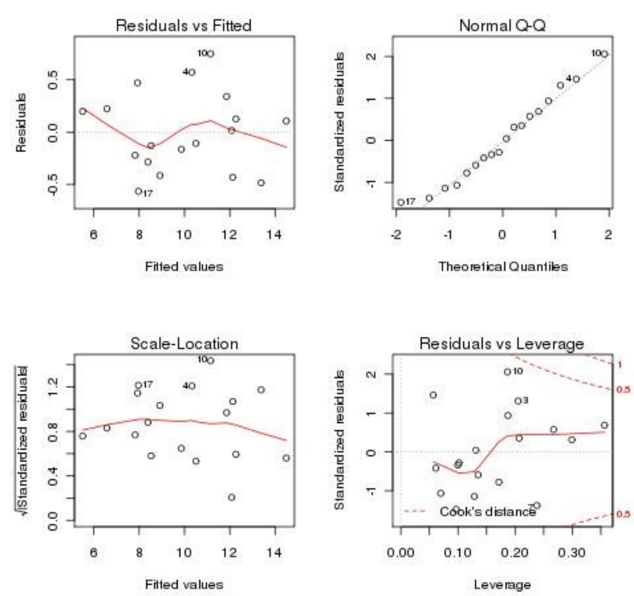




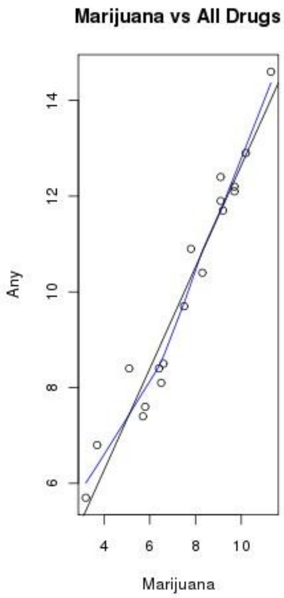


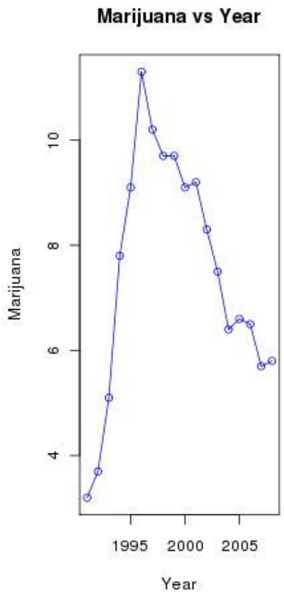


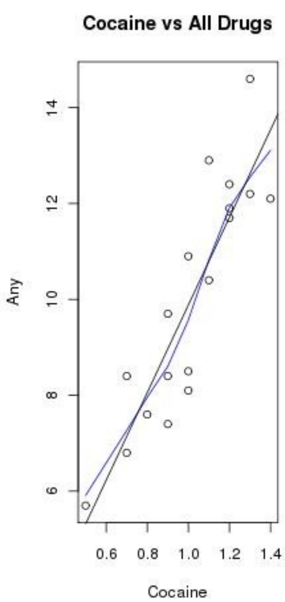
Linear Regression Plot

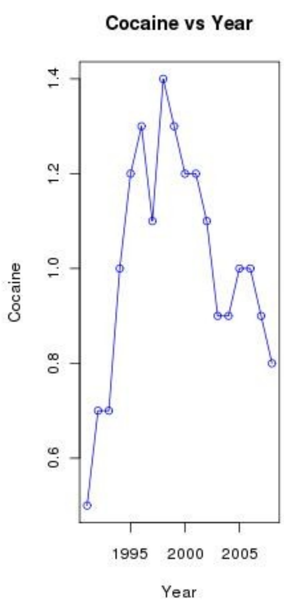


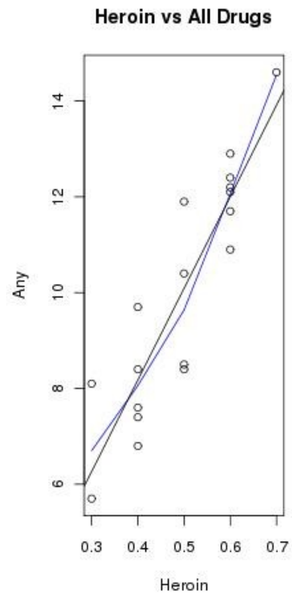
Eighth Grade cont.

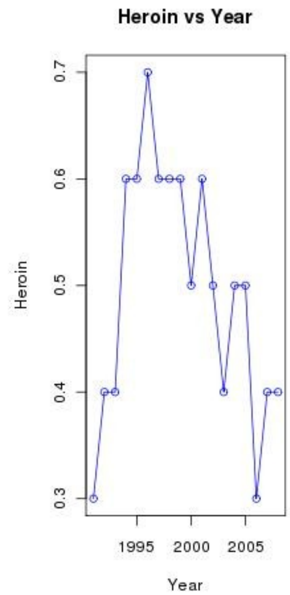


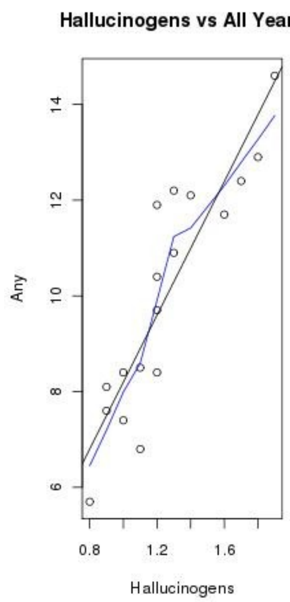


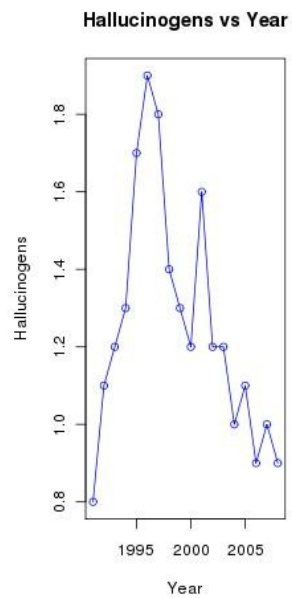


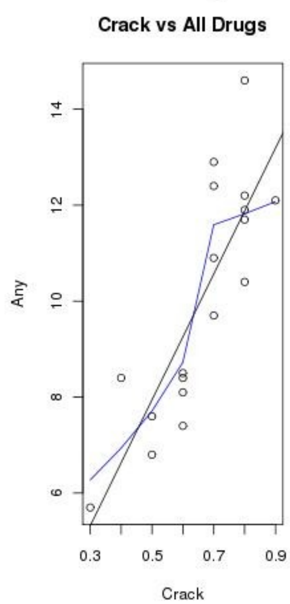


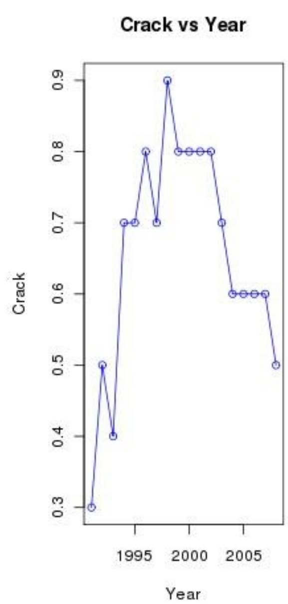




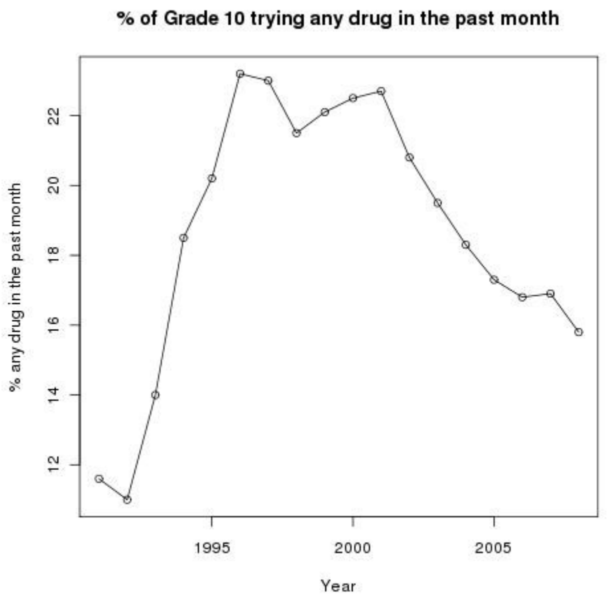


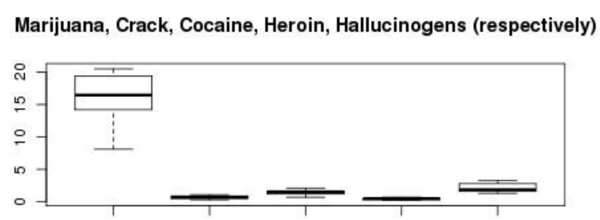


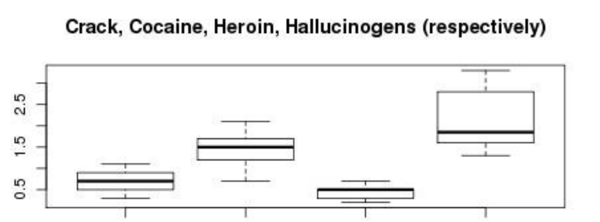


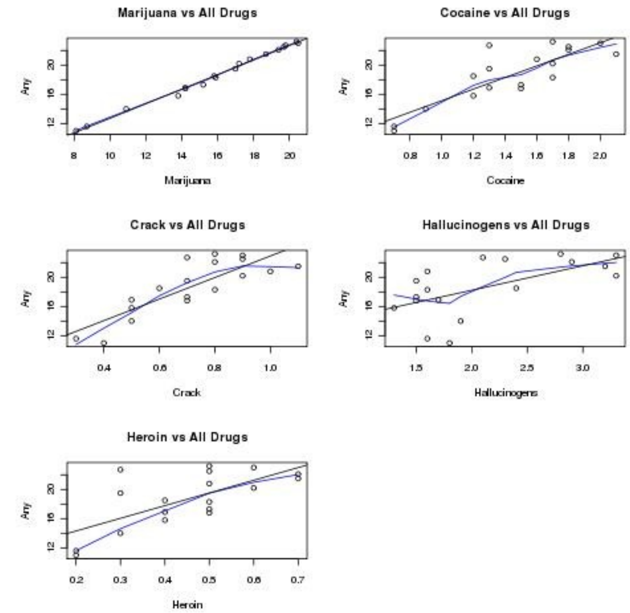


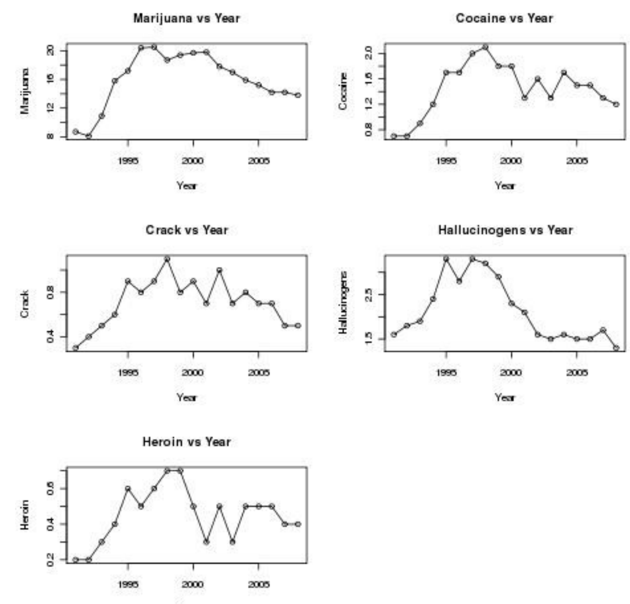
Tenth Grade



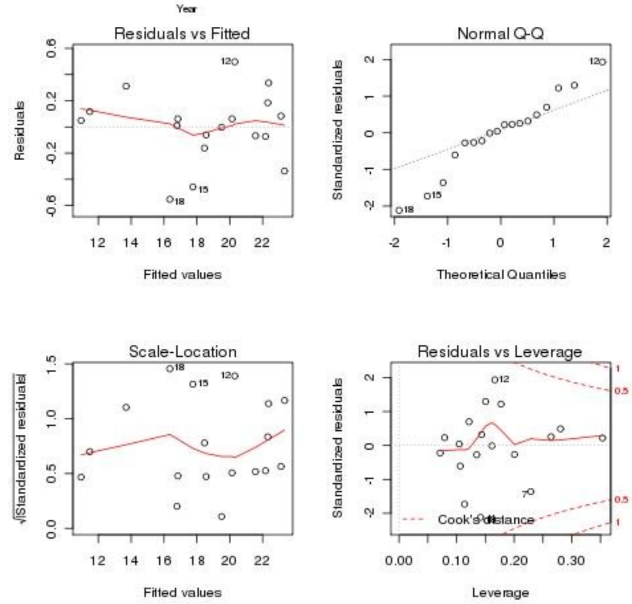




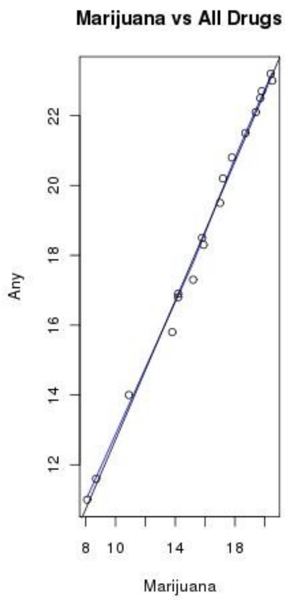


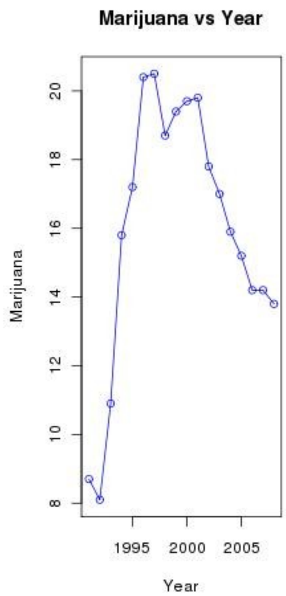


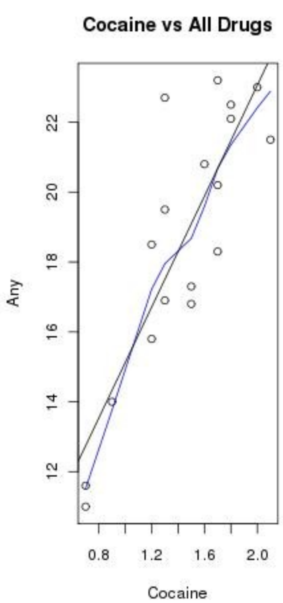
Linear Regression Plot

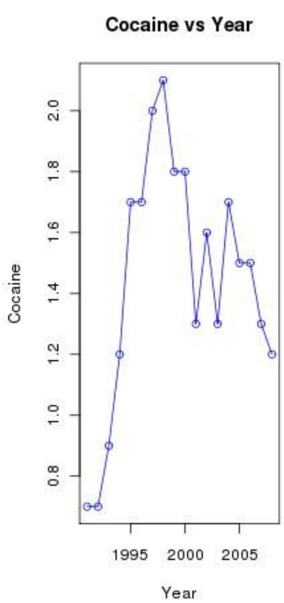


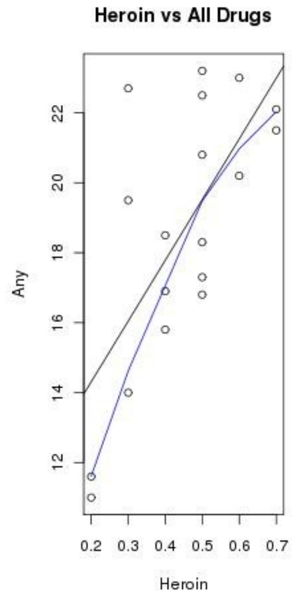
Tenth Grade cont.

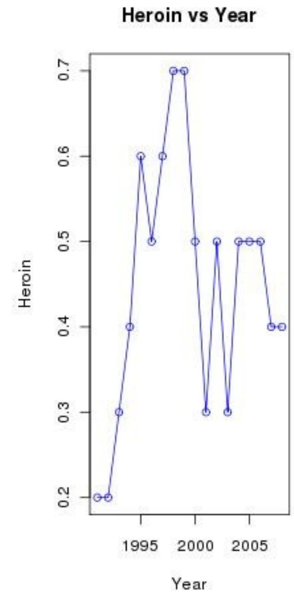


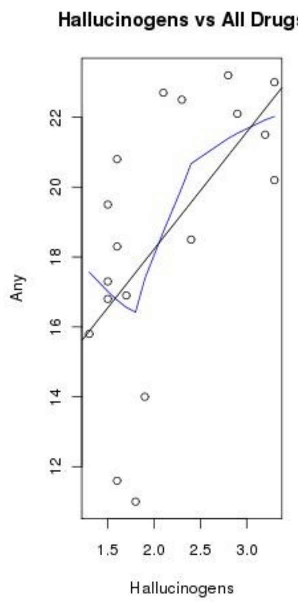


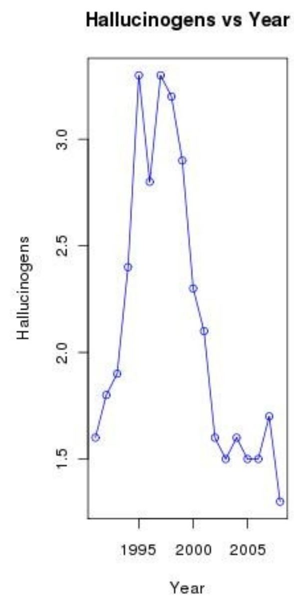


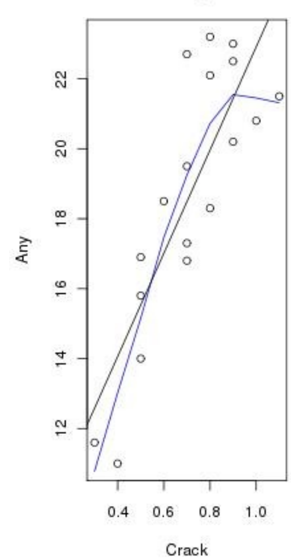


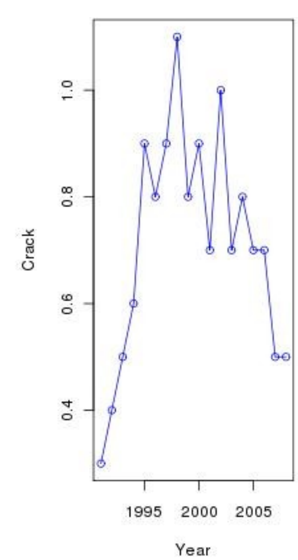




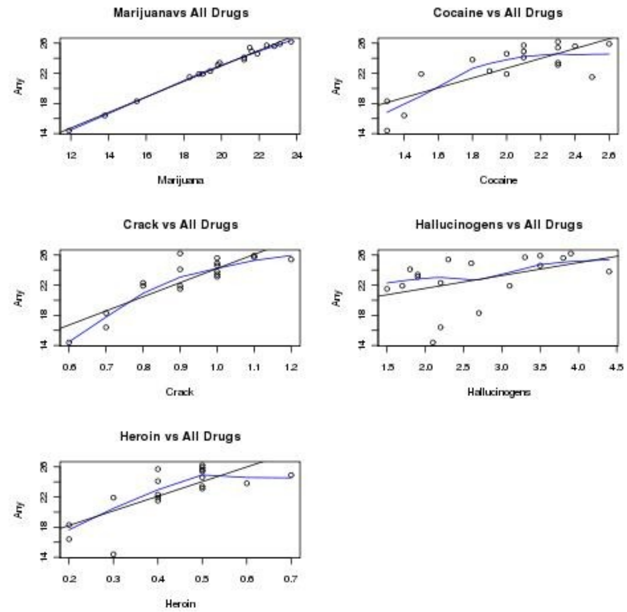


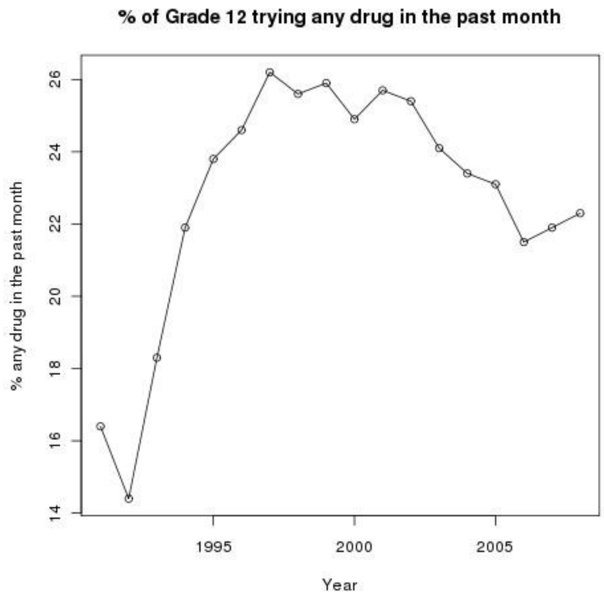


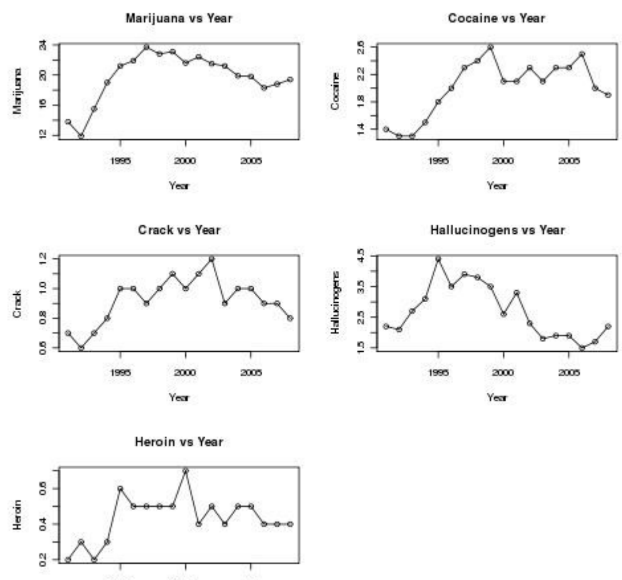


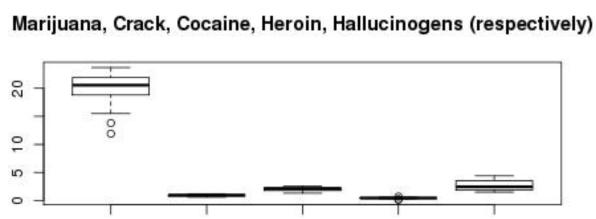


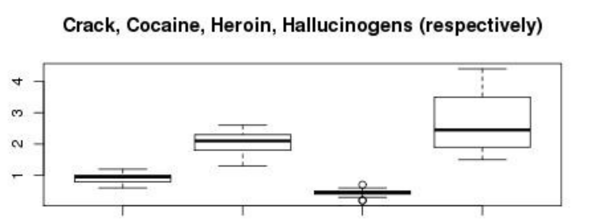
Twelfth Grade



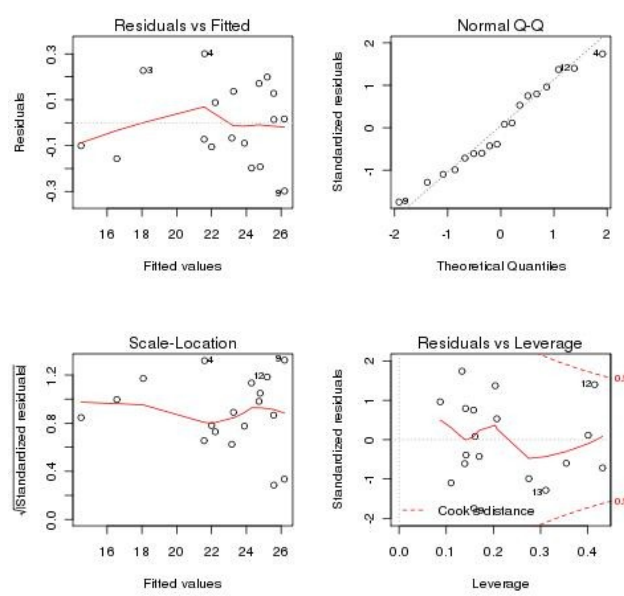




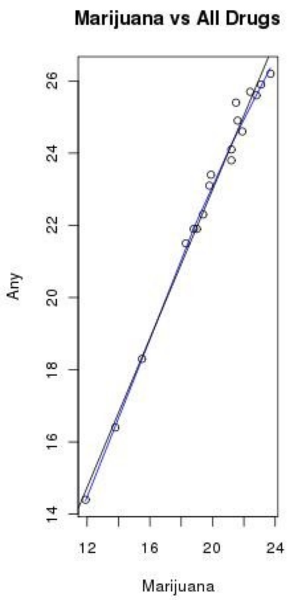


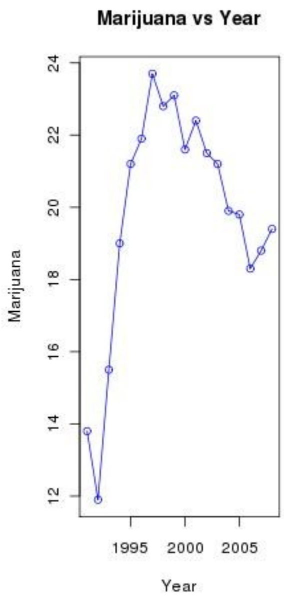


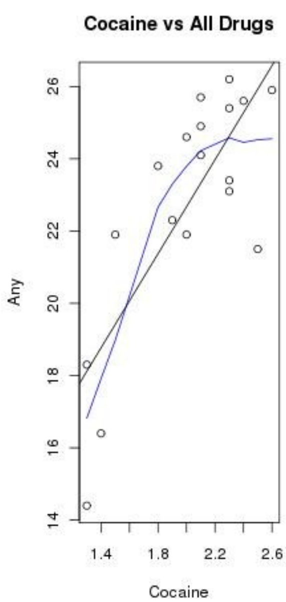
Linear Regression Plot

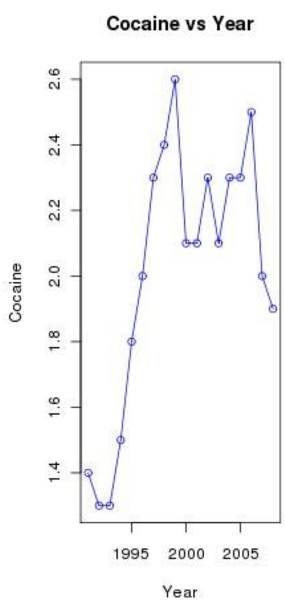


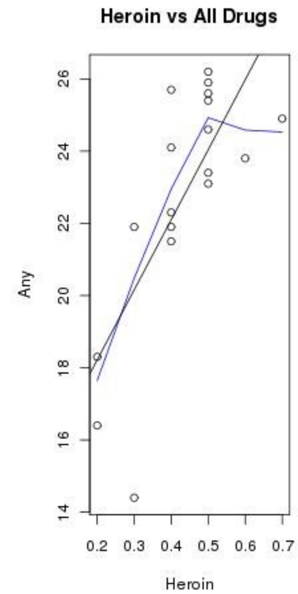
Twelfth Grade cont.

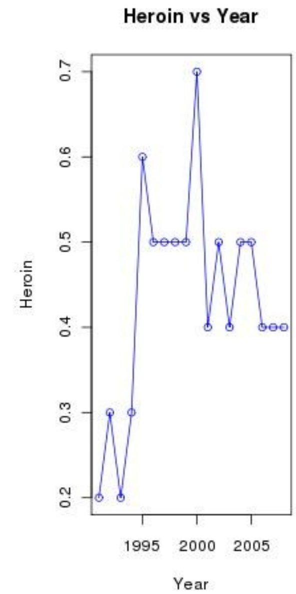


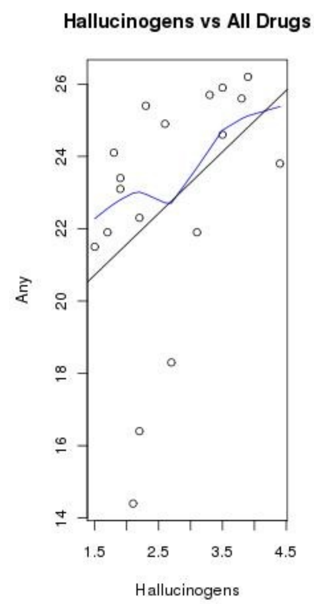


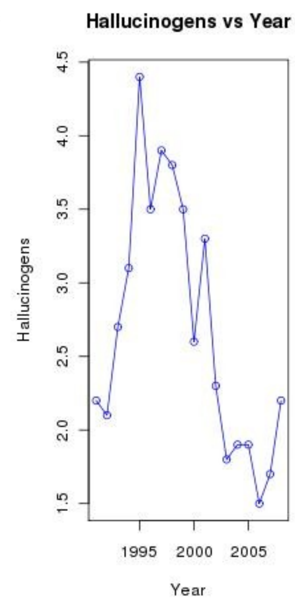


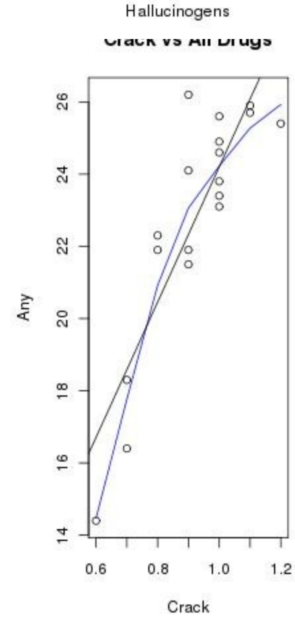


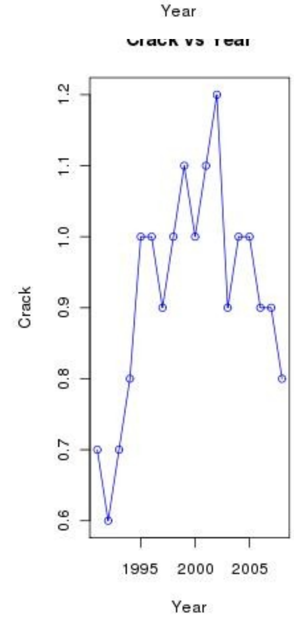




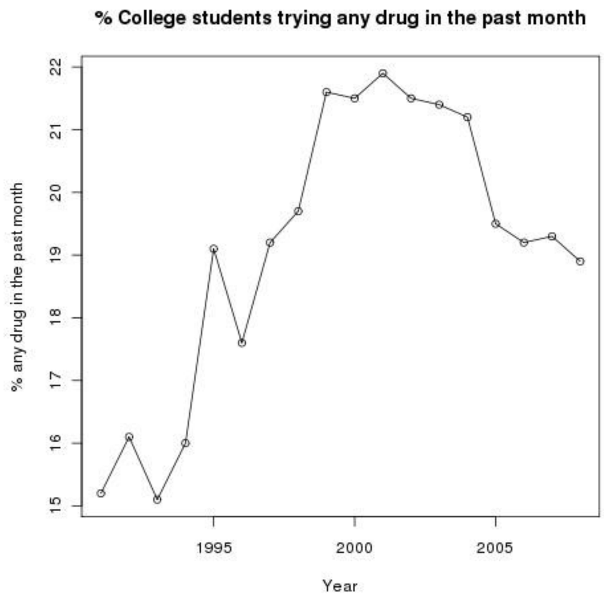


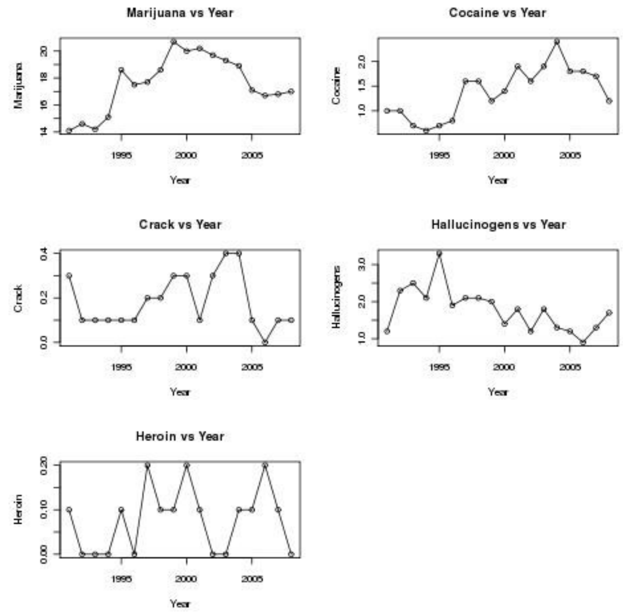


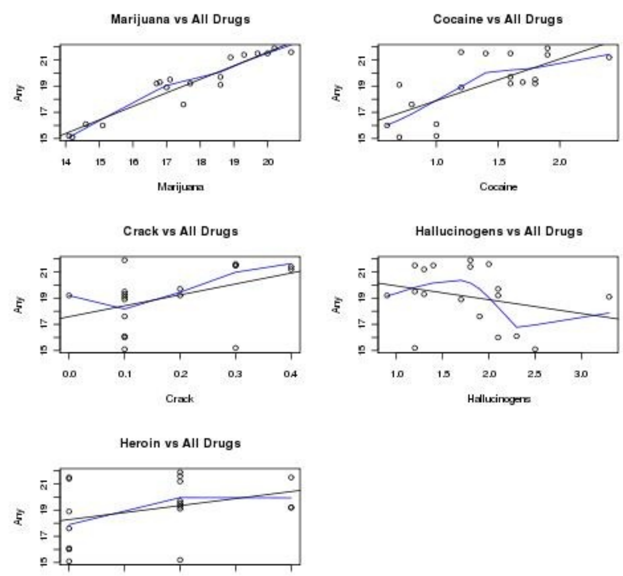


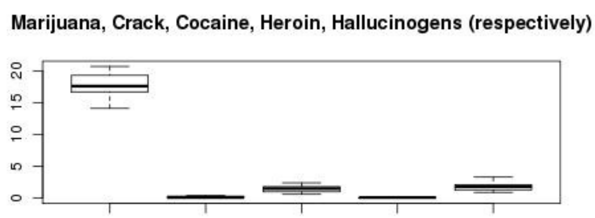


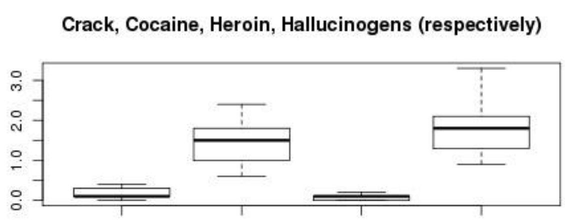
College



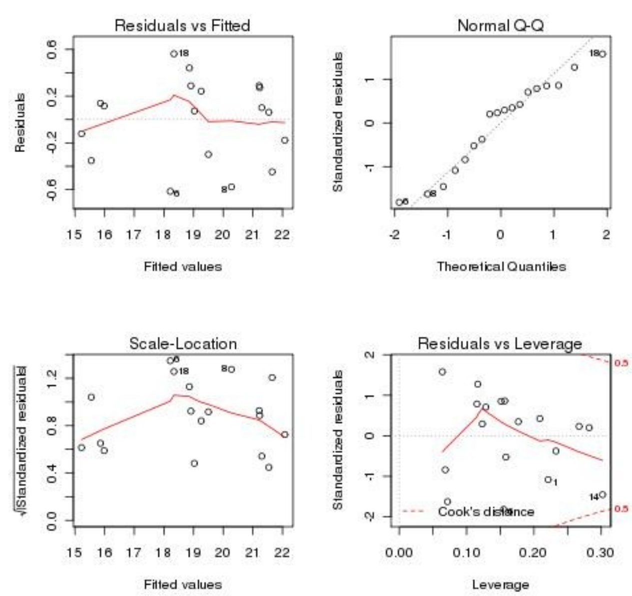




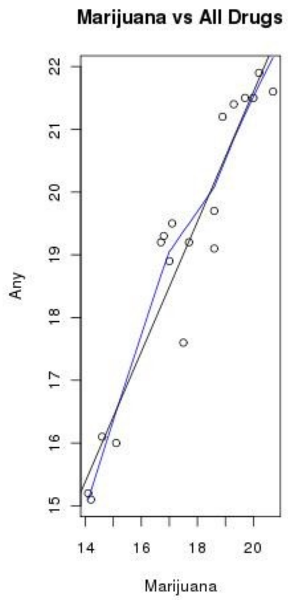


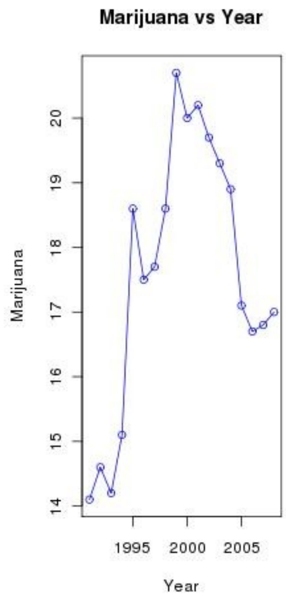


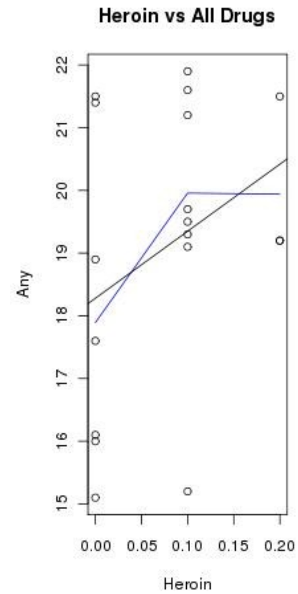
Linear Regression Plot

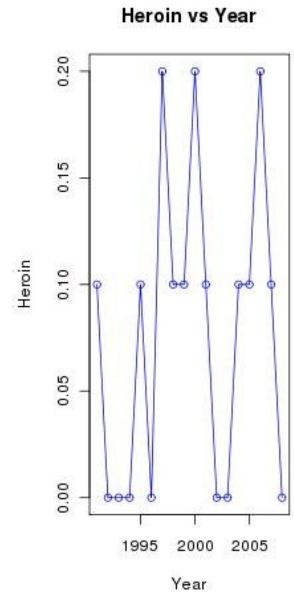


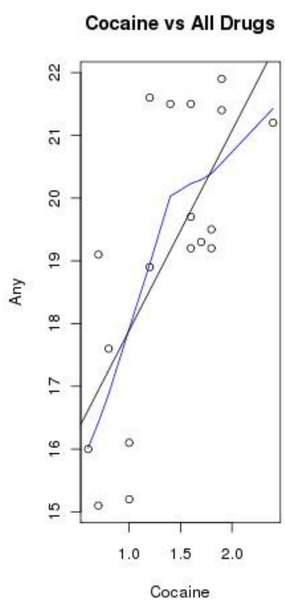
College cont.

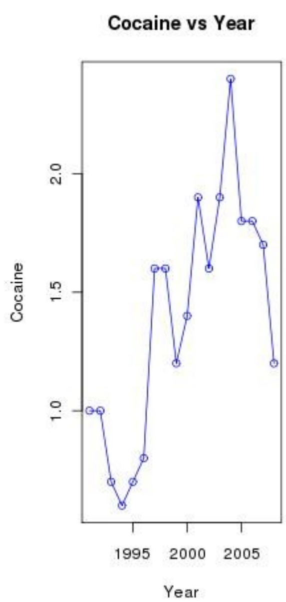


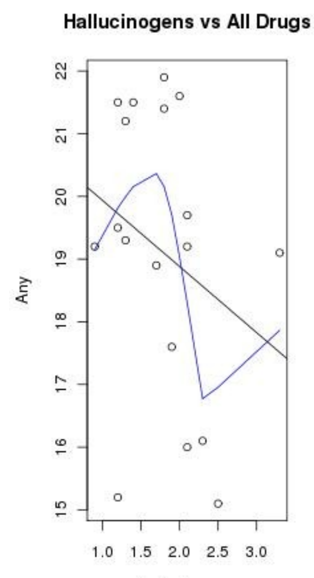


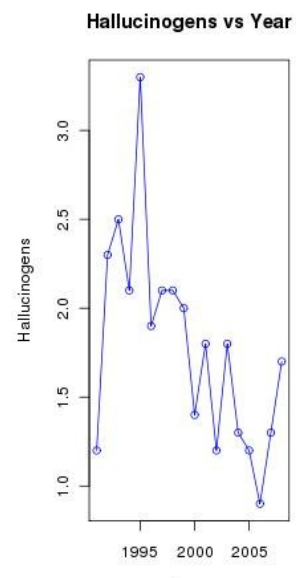


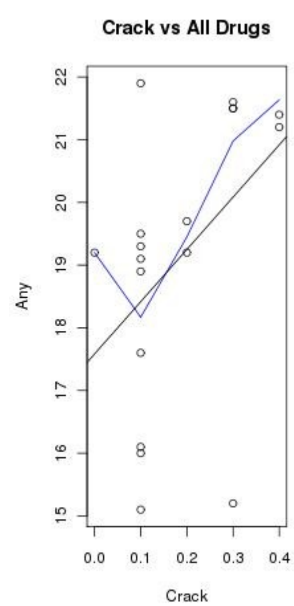


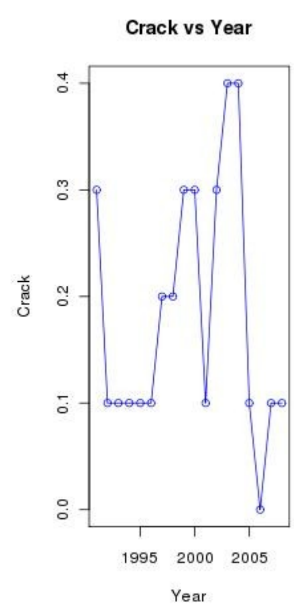




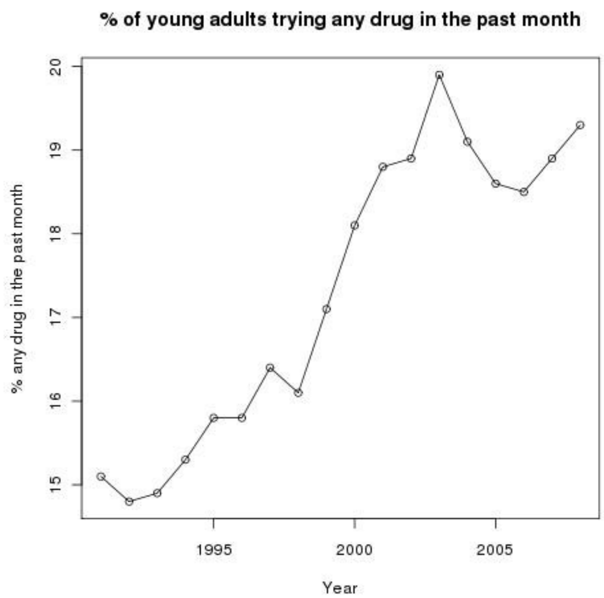


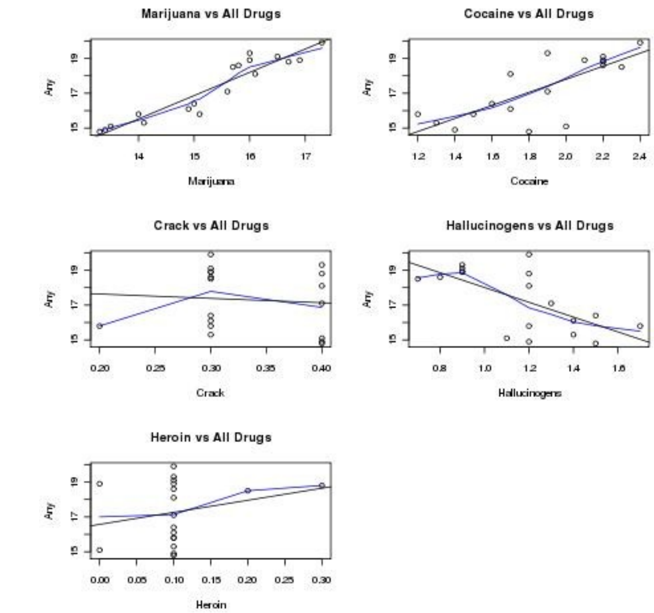


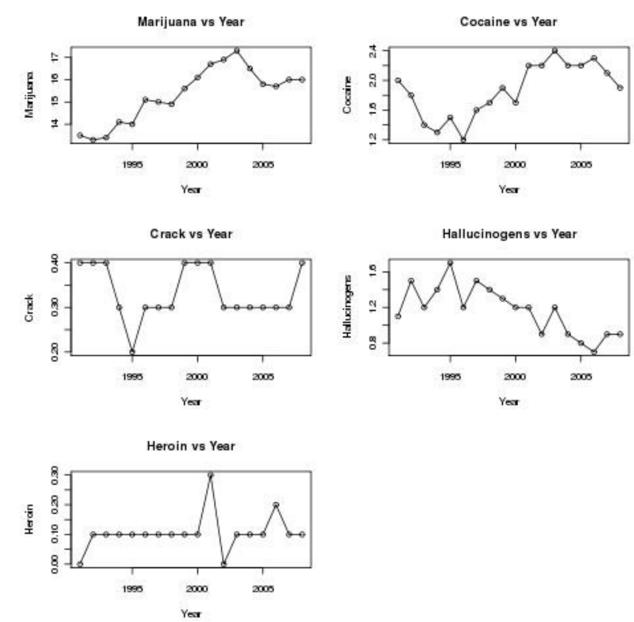


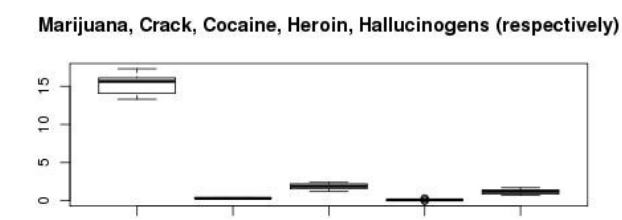


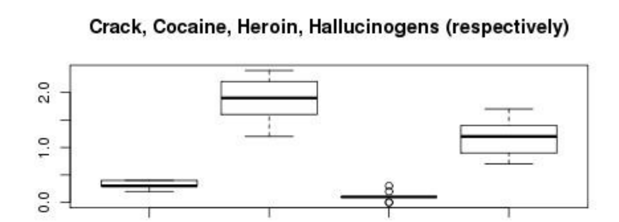
Young Adult



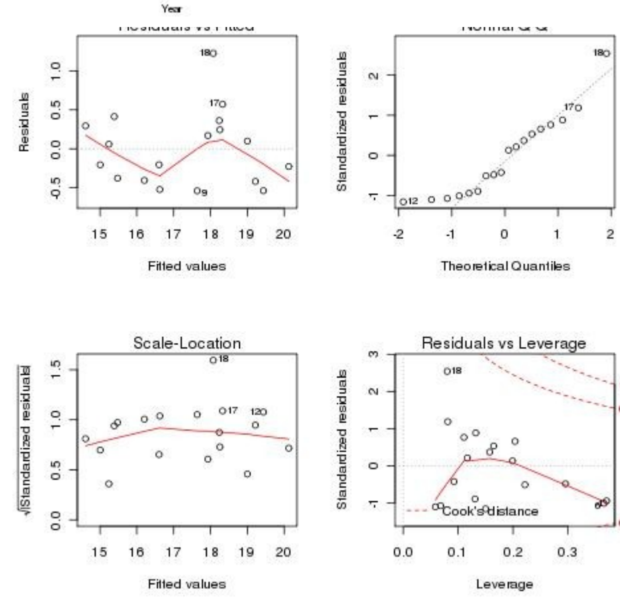




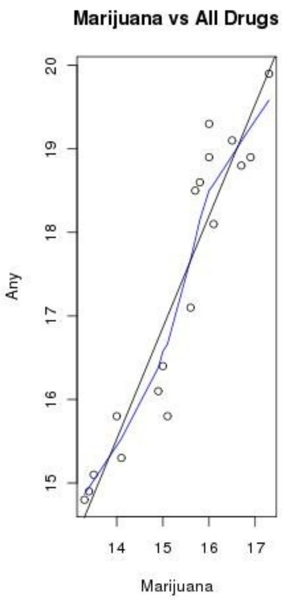


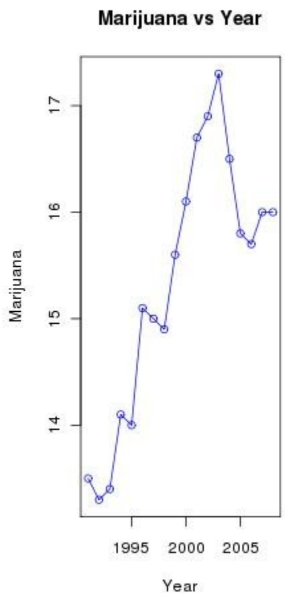


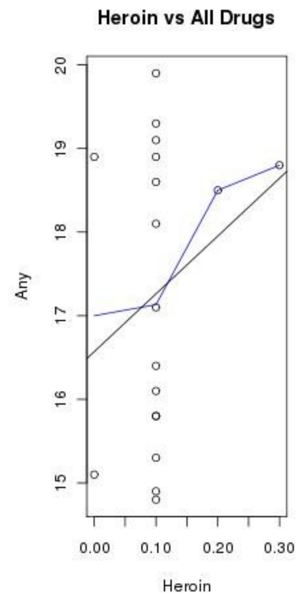
Linear Regression Plot

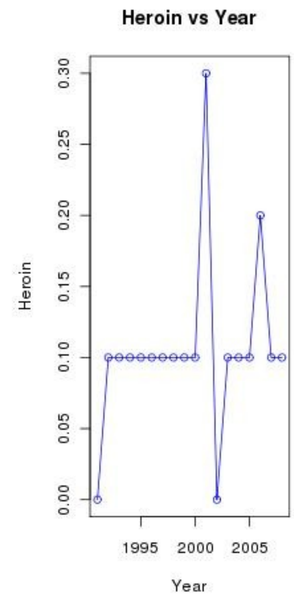


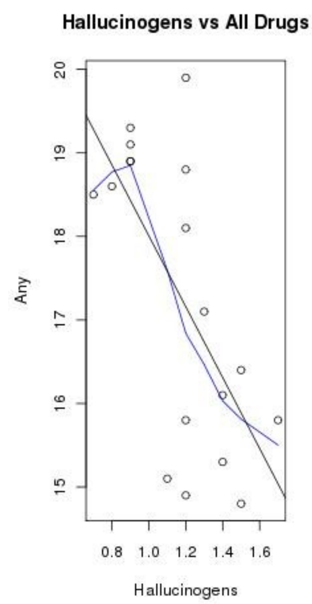
Young Adult cont.

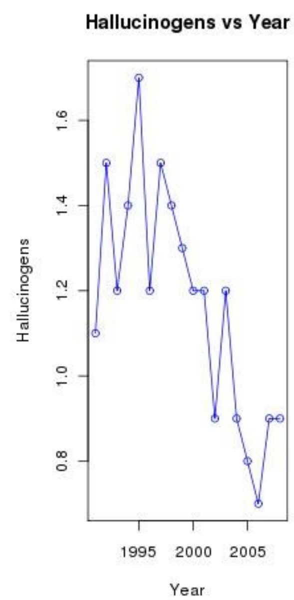


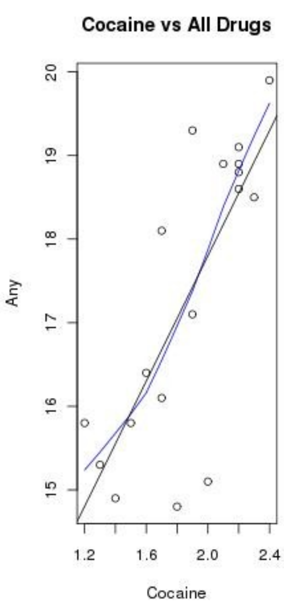


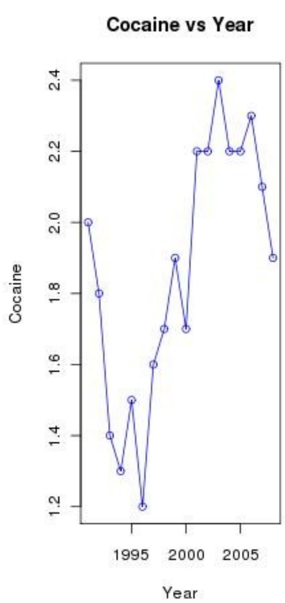


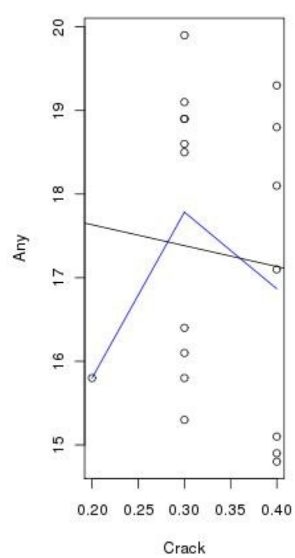


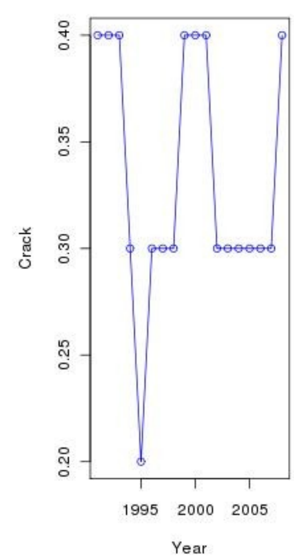




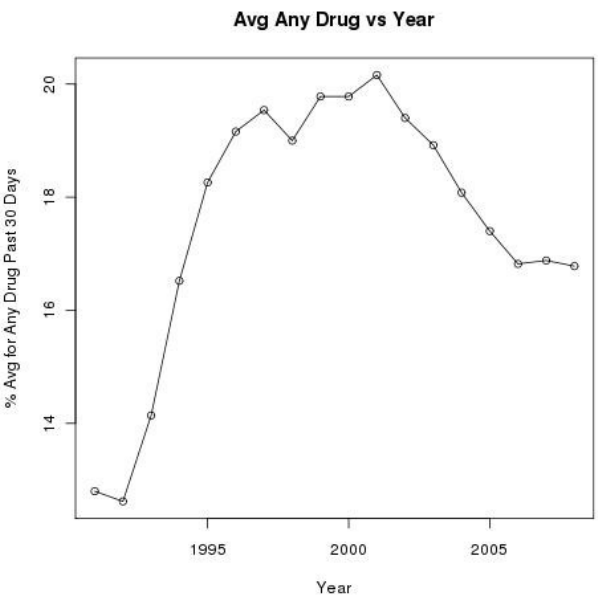


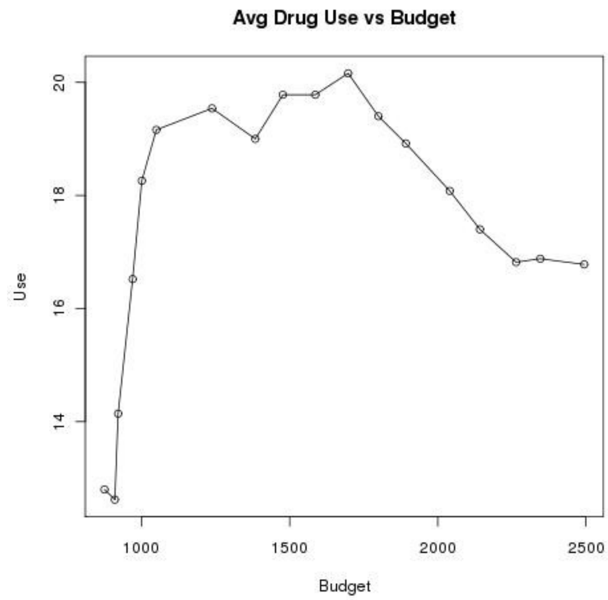


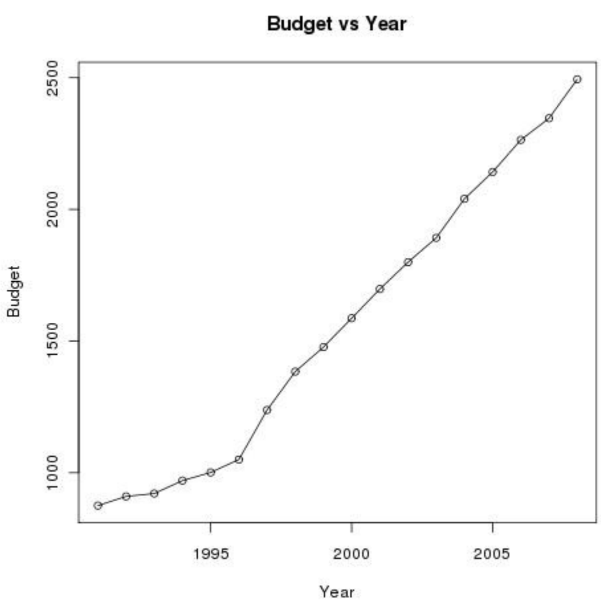


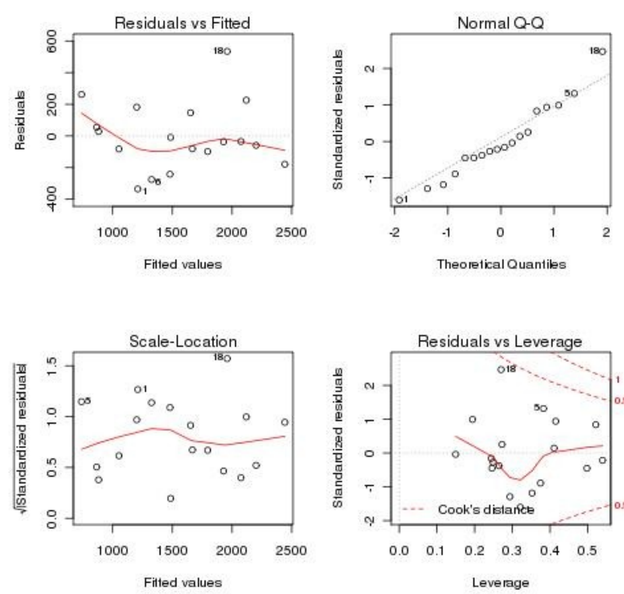


Budget and Drug Use

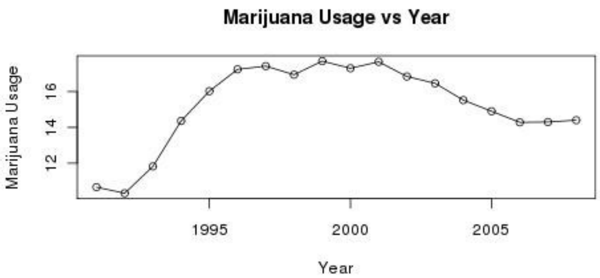


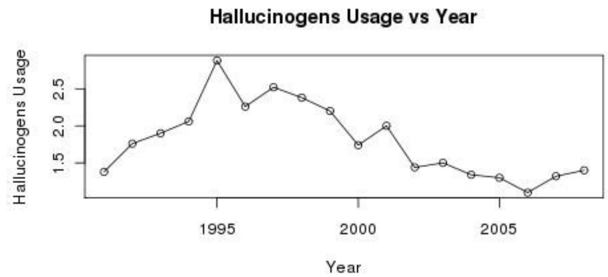


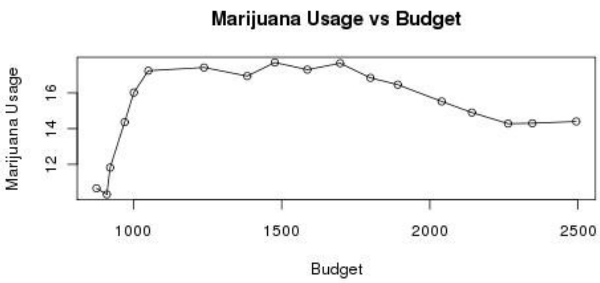


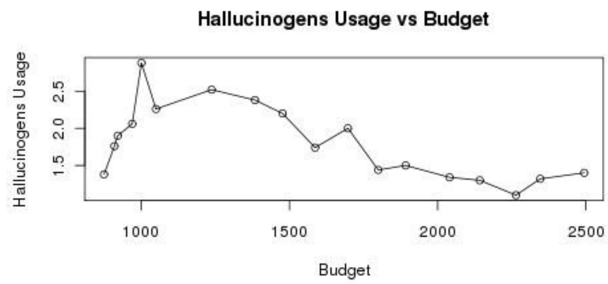


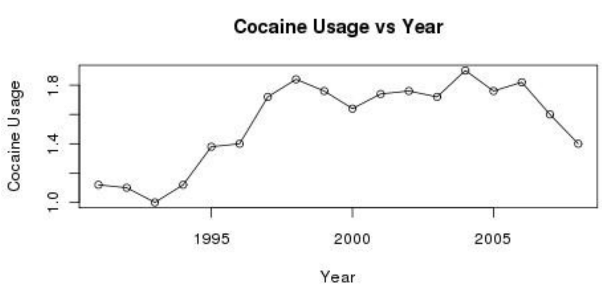
Budget and Drug Use cont.

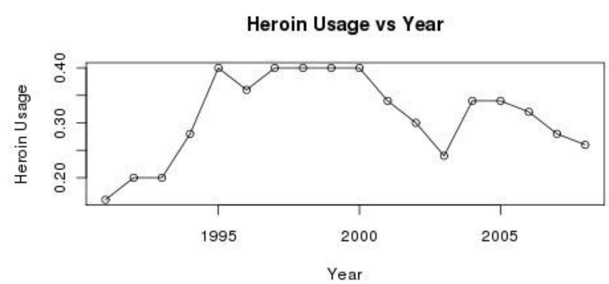


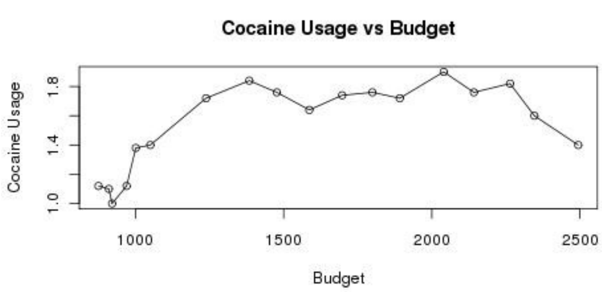


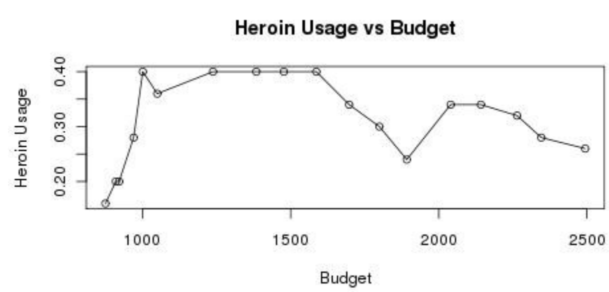












APPENDIX – OUTPUT

Grade Eight

Marijuana

```
lm(formula = Any ~ Marijuana)

Residuals:
    Min      1Q  Median      3Q     Max 
-0.8279 -0.4342 -0.1089  0.5019  0.9580 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  2.02904    0.47700   4.254 0.000606 ***
Marijuana    1.06136    0.06105  17.386  8.2e-12 ***

Residual standard error: 0.5726 on 16 degrees of freedom
Multiple R-squared: 0.9497,  Adjusted R-squared: 0.9466 
F-statistic: 302.3 on 1 and 16 DF,  p-value: 8.195e-12

        Pearson's product-moment correlation

data:  Any and Marijuana 
t = 17.3861, df = 16, p-value = 8.195e-12
alternative hypothesis: true correlation is not equal to 0 
95 percent confidence interval:
 0.9314777 0.9906712 
sample estimates:
      cor 
0.9745405
```

Cocaine

```
lm(formula = Any ~ Cocaine)

Residuals:
    Min      1Q  Median      3Q     Max 
-1.7818 -0.5398 -0.1750  0.7216  2.1046 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)   0.7455     1.2512   0.596     0.56    
Cocaine       9.1364     1.2058   7.577 1.11e-06 ***

Residual standard error: 1.192 on 16 degrees of freedom
Multiple R-squared: 0.782,    Adjusted R-squared: 0.7684 
F-statistic: 57.41 on 1 and 16 DF,  p-value: 1.114e-06
```

```
        Pearson's product-moment correlation

data:  Any and Cocaine
t = 7.5769, df = 16, p-value = 1.114e-06
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.7110222 0.9563545
sample estimates:
      cor 
0.8843334 
```

Crack

```
lm(formula = Any ~ Crack)

Residuals:
    Min      1Q  Median      3Q     Max 
-1.8547 -1.0335 -0.2605  0.3683  2.7222 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)    1.386      1.447   0.958    0.352    
Crack         13.115      2.149   6.103 1.52e-05 ***

Residual standard error: 1.4 on 16 degrees of freedom
Multiple R-squared: 0.6995,  Adjusted R-squared: 0.6808 
F-statistic: 37.25 on 1 and 16 DF,  p-value: 1.524e-05 

        Pearson's product-moment correlation

data:  Any and Crack
t = 6.1035, df = 16, p-value = 1.524e-05
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.6062468 0.9372687
sample estimates:
      cor 
0.8363871 
```

Hallucinogens

```
lm(formula = Any ~ Hallucinogens)

Residuals:
    Min      1Q  Median      3Q     Max 
-2.0967 -0.7710  0.1026  0.6048  2.3048 

Coefficients:
              Estimate Std. Error t value Pr(>|t|)    
(Intercept)     1.2125     1.1395   1.064    0.303    
Hallucinogens   6.9857     0.8815   7.925 6.26e-07 ***

Residual standard error: 1.151 on 16 degrees of freedom
Multiple R-squared: 0.797,	Adjusted R-squared: 0.7843 
F-statistic: 62.81 on 1 and 16 DF,  p-value: 6.264e-07

	Pearson's product-moment correlation

data:  Any and Hallucinogens 
t = 7.9251, df = 16, p-value = 6.264e-07
alternative hypothesis: true correlation is not equal to 0 
95 percent confidence interval:
 0.7302043 0.9596358 
sample estimates:
      cor 
0.8927325 
```

Heroin

```
lm(formula = Any ~ Heroin)

Residuals:
    Min      1Q  Median      3Q     Max 
-1.6896 -0.7270  0.1478  0.6134  1.8356 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)   0.5266     1.1966   0.440    0.666    
Heroin       19.1259     2.3593   8.107 4.67e-07 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 

Residual standard error: 1.13 on 16 degrees of freedom
Multiple R-squared: 0.8042,  Adjusted R-squared: 0.792 
F-statistic: 65.72 on 1 and 16 DF,  p-value: 4.668e-07
```

Pearson's product-moment correlation

data: Any and Heroin
t = 8.1067, df = 16, p-value = 4.668e-07
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
0.7395286 0.9612086
sample estimates:
cor
0.8967748

Any Drug using All Five as Predictors

lm(formula = Any ~ Marijuana + Cocaine + Crack + Heroin + Hallucinogens)

Residuals:

Min	1Q	Median	3Q	Max
-0.51909	-0.29014	0.01008	0.22944	0.79323

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	1.1210	0.6654	1.685	0.117825	
Marijuana	0.8178	0.1861	4.394	0.000874	***
Cocaine	-0.2677	1.7301	-0.155	0.879611	
Crack	-0.3528	2.1367	-0.165	0.871619	
Heroin	2.0053	2.1751	0.922	0.374711	
Hallucinogens	1.7868	0.8042	2.222	0.046280	*

Residual standard error: 0.4348 on 12 degrees of freedom
Multiple R-squared: 0.9783, Adjusted R-squared: 0.9692
F-statistic: 108 on 5 and 12 DF, p-value: 1.504e-09

ANOVA using All Five as Predictors
Analysis of Variance Table

Response: Any

	Df	Sum Sq	Mean Sq	F value	Pr(>F)	
Marijuana	1	99.118	99.118	524.3090	2.858e-11	***
Cocaine	1	0.486	0.486	2.5700	0.13489	
Crack	1	0.200	0.200	1.0554	0.32452	
Heroin	1	1.359	1.359	7.1903	0.01998	*
Hallucinogens	1	0.933	0.933	4.9368	0.04628	*
Residuals	12	2.269	0.189			

Any using Three Most Significant Variables as Predictors

```
lm(formula = Any ~ Marijuana + Heroin + Hallucinogens)

Residuals:
     Min       1Q   Median       3Q      Max
-0.55208 -0.25637 -0.02193  0.20884  0.79091

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    0.95677    0.44272   2.161  0.04850 *
Marijuana      0.76209    0.08883   8.579 6.02e-07 ***
Heroin         1.78151    1.93096   0.923  0.37184
Hallucinogens  1.93882    0.63298   3.063  0.00843 **

Residual standard error: 0.4046 on 14 degrees of freedom
Multiple R-squared: 0.978,    Adjusted R-squared: 0.9733
F-statistic: 207.8 on 3 and 14 DF,  p-value: 7.674e-12
```

Any using Two Most Significant Variables as Predictors

```
lm(formula = Any ~ Marijuana + Hallucinogens)

Residuals:
     Min       1Q   Median       3Q      Max
-0.56467 -0.26895 -0.04589  0.21621  0.74778

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    1.13037    0.39875   2.835 0.012546 *
Marijuana      0.80562    0.07489  10.757 1.90e-08 ***
Hallucinogens  2.24230    0.53811   4.167 0.000826 ***

Residual standard error: 0.4026 on 15 degrees of freedom
Multiple R-squared: 0.9767,  Adjusted R-squared: 0.9736
F-statistic: 314.4 on 2 and 15 DF,  p-value: 5.69e-13
```

Grade Ten

Marijuana

```
lm(formula = Any ~ Marijuana)

Residuals:
    Min      1Q  Median      3Q     Max
-0.6996 -0.1492  0.0764  0.1744  0.3861

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   2.7679     0.3211    8.62 2.08e-07 ***
Marijuana     0.9950     0.0196   50.77  < 2e-16 ***

Residual standard error: 0.3074 on 16 degrees of freedom
Multiple R-squared: 0.9938,  Adjusted R-squared: 0.9934
F-statistic:  2578 on 1 and 16 DF,  p-value: < 2.2e-16

            Pearson's product-moment correlation

data:  Any and Marijuana
t = 50.7691, df = 16, p-value < 2.2e-16
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.9915226 0.9988761
sample estimates:
      cor
0.9969106
```

Cocaine

```
lm(formula = Any ~ Cocaine)

Residuals:
    Min      1Q  Median      3Q     Max
-2.3784 -1.5910 -0.4035  0.9997  5.1965

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)    7.185      1.848   3.887  0.00131 **
Cocaine        7.937      1.234   6.431 8.31e-06 ***

Residual standard error: 2.067 on 16 degrees of freedom
Multiple R-squared: 0.721,    Adjusted R-squared: 0.7036
F-statistic: 41.36 on 1 and 16 DF,  p-value: 8.31e-06


            Pearson's product-moment correlation
```

data: Any and Cocaine
t = 6.4308, df = 16, p-value = 8.31e-06
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.6333545 0.9424045
sample estimates:
     cor
0.849139

Crack

lm(formula = Any ~ Crack)

Residuals:

Min	1Q	Median	3Q	Max
-3.058	-1.630	-0.358	1.459	4.214

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	8.154	1.826	4.465	0.000391	***
Crack	14.760	2.465	5.988	1.89e-05	***

Residual standard error: 2.174 on 16 degrees of freedom
Multiple R-squared: 0.6915, Adjusted R-squared: 0.6722
F-statistic: 35.86 on 1 and 16 DF, p-value: 1.893e-05

Pearson's product-moment correlation

data: Any and Crack
t = 5.9884, df = 16, p-value = 1.893e-05
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.5961135 0.9353112
sample estimates:
      cor
0.8315554

Hallucinogens

lm(formula = Any ~ Hallucinogens)

Residuals:

```
    Min      1Q  Median      3Q     Max 
-6.5518 -0.9821  0.3380  2.0779  4.1431 
```

Coefficients:

```
              Estimate Std. Error t value Pr(>|t|)    
(Intercept)     11.521      2.434   4.734 0.000225 ***
Hallucinogens    3.350      1.091   3.071 0.007309 ** 
```

Residual standard error: 3.104 on 16 degrees of freedom
Multiple R-squared: 0.3709, Adjusted R-squared: 0.3315
F-statistic: 9.432 on 1 and 16 DF, p-value: 0.007309

Pearson's product-moment correlation

data: Any and Hallucinogens
t = 3.0711, df = 16, p-value = 0.007309
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.1985767 0.8376880
sample estimates:
      cor
0.6089878

Heroin

lm(formula = Any ~ Heroin)

Residuals:

```
    Min      1Q  Median      3Q     Max 
-3.3091 -2.0295 -0.9727  1.6295  6.6545 
```

Coefficients:

```
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)   10.836      2.165   5.005 0.000130 ***
Heroin        17.364      4.576   3.795 0.001590 ** 
```

Residual standard error: 2.839 on 16 degrees of freedom
Multiple R-squared: 0.4737, Adjusted R-squared: 0.4408
F-statistic: 14.4 on 1 and 16 DF, p-value: 0.00159

Pearson's product-moment correlation

```
data:  Any and Heroin
t = 3.7948, df = 16, p-value = 0.00159
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.3261986 0.8742159
sample estimates:
     cor
0.688253
```

Any using All Five as Predictors

```
lm(formula = Any ~ Marijuana + Cocaine + Crack + Heroin + Hallucinogens)

Residuals:
     Min       1Q   Median       3Q      Max
-0.35997 -0.15476  0.03665  0.14137  0.33818

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)     2.6653     0.2387  11.164 1.08e-07 ***
Marijuana       0.9924     0.0337  29.449 1.47e-12 ***
Cocaine        -1.1710     0.6782  -1.727   0.1099
Crack           1.8713     0.6700   2.793   0.0163 *
Heroin         -0.3176     1.1745  -0.270   0.7915
Hallucinogens   0.3050     0.1081   2.820   0.0154 *

Residual standard error: 0.2238 on 12 degrees of freedom
Multiple R-squared: 0.9975,  Adjusted R-squared: 0.9965
F-statistic: 976.5 on 5 and 12 DF,  p-value: 3.175e-15
```

ANOVA of All Five as Predictors

```
Analysis of Variance Table

Response: Any
              Df  Sum Sq Mean Sq   F value  Pr(>F)
Marijuana      1 243.533 243.533 4864.2954 < 2e-16 ***
Cocaine        1   0.060   0.060    1.1965 0.29549
Crack          1   0.419   0.419    8.3627 0.01353 *
Heroin         1   0.034   0.034    0.6818 0.42508
Hallucinogens  1   0.398   0.398    7.9544 0.01545 *
Residuals     12   0.601   0.050
```

Any using Three Most Significant as Predictors

```
lm(formula = Any ~ Marijuana + Crack + Hallucinogens)

Residuals:
     Min       1Q   Median       3Q      Max 
-0.52803 -0.11176  0.02092  0.13626  0.42809 

Coefficients:
              Estimate Std. Error t value Pr(>|t|)    
(Intercept)    2.67334    0.30835   8.670 5.31e-07 ***
Marijuana      0.95703    0.03349  28.576 8.16e-14 ***
Crack          0.29240    0.59263   0.493   0.6294    
Hallucinogens  0.23196    0.12765   1.817   0.0906 .  

Residual standard error: 0.289 on 14 degrees of freedom
Multiple R-squared: 0.9952,  Adjusted R-squared: 0.9942 
F-statistic: 973.3 on 3 and 14 DF,  p-value: < 2.2e-16
```

Any using Two Most Significant as Predictors

```
lm(formula = Any ~ Marijuana + Hallucinogens)

Residuals:
     Min       1Q   Median       3Q      Max 
-0.55255 -0.07103  0.03003  0.10838  0.49712 

Coefficients:
              Estimate Std. Error t value Pr(>|t|)    
(Intercept)    2.65896    0.29913   8.889  2.3e-07 ***
Marijuana      0.96920    0.02207  43.918  < 2e-16 ***
Hallucinogens  0.24512    0.12164   2.015   0.0622 .  

Residual standard error: 0.2816 on 15 degrees of freedom
Multiple R-squared: 0.9951,  Adjusted R-squared: 0.9945 
F-statistic:  1537 on 2 and 15 DF,  p-value: < 2.2e-16
```

Grade Twelve

Marijuana

```
lm(formula = Any ~ Marijuana)

Residuals:
     Min       1Q   Median       3Q      Max 
-0.59487 -0.26196 -0.06091  0.26037  0.87062 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  2.38936    0.56672   4.216 0.000656 ***
Marijuana    1.02977    0.02832  36.367  < 2e-16 ***

Residual standard error: 0.377 on 16 degrees of freedom
Multiple R-squared: 0.988,	Adjusted R-squared: 0.9873 
F-statistic:  1323 on 1 and 16 DF,  p-value: < 2.2e-16 

	Pearson's product-moment correlation

data:  Any and Marijuana 
t = 36.3669, df = 16, p-value < 2.2e-16
alternative hypothesis: true correlation is not equal to 0 
95 percent confidence interval:
 0.9835925 0.9978171 
sample estimates:
      cor 
0.9940054 
```

Cocaine

```
lm(formula = Any ~ Cocaine)

Residuals:
    Min      1Q  Median      3Q     Max 
-4.4267 -1.1117  0.3015  1.5765  2.4824 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)    9.654      2.594   3.722  0.00185 ** 
Cocaine        6.509      1.266   5.143 9.82e-05 ***

Residual standard error: 2.117 on 16 degrees of freedom
Multiple R-squared: 0.6231,	Adjusted R-squared: 0.5995 
F-statistic: 26.45 on 1 and 16 DF,  p-value: 9.82e-05 


	Pearson's product-moment correlation
```

```
data:  Any and Cocaine
t = 5.143, df = 16, p-value = 9.82e-05
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.5106915 0.9179412
sample estimates:
      cor
0.7893577
```

Crack

```
lm(formula = Any ~ Crack)

Residuals:
    Min      1Q  Median      3Q     Max
-2.5486 -0.8215 -0.3281  1.2234  3.8719

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)    5.466      2.470   2.213   0.0417 *
Crack         18.735      2.643   7.089 2.56e-06 ***

Residual standard error: 1.695 on 16 degrees of freedom
Multiple R-squared: 0.7585,  Adjusted R-squared: 0.7434
F-statistic: 50.26 on 1 and 16 DF,  p-value: 2.564e-06

            Pearson's product-moment correlation

data:  Any and Crack
t = 7.0891, df = 16, p-value = 2.564e-06
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.6809237 0.9510780
sample estimates:
      cor
0.8709244
```

Hallucinogens

```
lm(formula = Any ~ Hallucinogens)

Residuals:
    Min      1Q  Median      3Q     Max 
-7.3418 -1.0613  0.9015  1.8800  3.3177 

Coefficients:
              Estimate Std. Error t value Pr(>|t|)    
(Intercept)    18.1665     2.4262   7.488 1.29e-06 ***
Hallucinogens   1.7025     0.8607   1.978   0.0654 .  

Residual standard error: 3.091 on 16 degrees of freedom
Multiple R-squared: 0.1965,  Adjusted R-squared: 0.1463 
F-statistic: 3.913 on 1 and 16 DF,  p-value: 0.06539

        Pearson's product-moment correlation

data:  Any and Hallucinogens 
t = 1.9782, df = 16, p-value = 0.06539
alternative hypothesis: true correlation is not equal to 0 
95 percent confidence interval:
 -0.02972232  0.75409864 
sample estimates:
      cor 
0.4432992 
```

Heroin

```
lm(formula = Any ~ Heroin)

Residuals:
    Min      1Q  Median      3Q     Max 
-5.7571 -0.8631  0.1429  1.6976  3.6024 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)   14.336      1.962   7.307 1.76e-06 ***
Heroin        19.405      4.351   4.460 0.000395 ***

Residual standard error: 2.302 on 16 degrees of freedom
Multiple R-squared: 0.5542,  Adjusted R-squared: 0.5263 
F-statistic: 19.89 on 1 and 16 DF,  p-value: 0.0003950
```

```
        Pearson's product-moment correlation

data:  Any and Heroin
t = 4.4598, df = 16, p-value = 0.0003950
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.4254367 0.8988948
sample estimates:
      cor
0.7444428
```

Any using All Five as Predictors

```
lm(formula = Any ~ Marijuana + Cocaine + Crack + Heroin + Hallucinogens)

Residuals:
     Min       1Q   Median       3Q      Max
-0.27535 -0.13517  0.05663  0.11876  0.19308

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    2.04860    0.29431   6.961 1.52e-05 ***
Marijuana      1.00200    0.03533  28.362 2.29e-12 ***
Cocaine       -0.38979    0.22626  -1.723 0.110576
Crack          2.78653    0.57294   4.864 0.000389 ***
Heroin        -0.04533    0.52937  -0.086 0.933167
Hallucinogens -0.32599    0.07460  -4.370 0.000913 ***

Residual standard error: 0.1789 on 12 degrees of freedom
Multiple R-squared: 0.998,    Adjusted R-squared: 0.9971
F-statistic:  1187 on 5 and 12 DF,  p-value: 9.874e-16
```

ANOVA using All Five as Predictors

```
Analysis of Variance Table

Response: Any
              Df  Sum Sq Mean Sq   F value    Pr(>F)
Marijuana      1 187.970 187.970 5875.7325 < 2.2e-16 ***
Cocaine        1   0.395   0.395   12.3481 0.0042704 **
Crack          1   0.876   0.876   27.3975 0.0002097 ***
Heroin         1   0.008   0.008    0.2442 0.6301445
Hallucinogens  1   0.611   0.611   19.0939 0.0009127 ***
Residuals     12   0.384   0.032
```

Any using Three Most Significant as Predictors

```
lm(formula = Any ~ Marijuana + Crack + Hallucinogens)

Residuals:
     Min       1Q   Median       3Q      Max
-0.29790 -0.10387 -0.02658  0.13427  0.30081

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    2.05645    0.28790   7.143 4.99e-06 ***
Marijuana      0.96591    0.02938  32.879 1.18e-14 ***
Crack          2.46407    0.54604   4.513 0.000487 ***
Hallucinogens -0.25189    0.06312  -3.991 0.001340 **

Residual standard error: 0.1856 on 14 degrees of freedom
Multiple R-squared: 0.9975,  Adjusted R-squared: 0.9969
F-statistic:  1836 on 3 and 14 DF,  p-value: < 2.2e-16
```

College

Marijuana

```
lm(formula = Any ~ Marijuana)

Residuals:
     Min       1Q   Median       3Q      Max
-1.40756 -0.47934  0.04044  0.49889  1.02088

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.8854     1.4865   0.596     0.56
Marijuana     1.0355     0.0839  12.343 1.37e-09 ***

Residual standard error: 0.723 on 16 degrees of freedom
Multiple R-squared: 0.905,     Adjusted R-squared: 0.899
F-statistic: 152.3 on 1 and 16 DF,  p-value: 1.367e-09

            Pearson's product-moment correlation

data:  Any and Marijuana
t = 12.3425, df = 16, p-value = 1.367e-09
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.8714613 0.9820178
sample estimates:
      cor
0.9512902
```

Cocaine

```
lm(formula = Any ~ Cocaine)

Residuals:
    Min      1Q  Median      3Q     Max
-2.6916 -1.0932 -0.3504  1.0203  3.0721

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  14.7104     1.1531  12.757 8.43e-10 ***
Cocaine       3.1812     0.7849   4.053 0.000923 ***

Residual standard error: 1.647 on 16 degrees of freedom
Multiple R-squared: 0.5066,  Adjusted R-squared: 0.4758
F-statistic: 16.43 on 1 and 16 DF,  p-value: 0.000923
```

```
        Pearson's product-moment correlation

data:  Any and Cocaine
t = 4.0532, df = 16, p-value = 0.000923
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.3667634 0.8846579
sample estimates:
      cor
0.7117585
```

Crack

```
lm(formula = Any ~ Crack)

Residuals:
    Min      1Q  Median      3Q     Max
-4.8841 -0.6246  0.4829  1.3329  3.4839

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  17.5821     0.9245   19.02 2.08e-12 ***
Crack         8.3401     4.2545    1.96   0.0676 .

Residual standard error: 2.106 on 16 degrees of freedom
Multiple R-squared: 0.1937,  Adjusted R-squared: 0.1433
F-statistic: 3.843 on 1 and 16 DF,  p-value: 0.06761

        Pearson's product-moment correlation

data:  Any and Crack
t = 1.9603, df = 16, p-value = 0.06761
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.03373192  0.75236217
sample estimates:
      cor
0.4400685
```

Hallucinogens

```
lm(formula = Any ~ Hallucinogens)

Residuals:
    Min      1Q  Median      3Q     Max
-4.5264 -1.2518  0.0982  1.7274  2.8065

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    20.9923     1.7447  12.032 1.98e-09 ***
Hallucinogens  -1.0548     0.9318  -1.132    0.274

Residual standard error: 2.257 on 16 degrees of freedom
Multiple R-squared: 0.07416,	Adjusted R-squared: 0.0163
F-statistic: 1.282 on 1 and 16 DF,  p-value: 0.2743

	Pearson's product-moment correlation

data:  Any and Hallucinogens
t = -1.1321, df = 16, p-value = 0.2743
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.6558143  0.2228829
sample estimates:
       cor
-0.2723246
```

Heroin

```
lm(formula = Any ~ Heroin)

Residuals:
    Min      1Q  Median      3Q     Max
-4.1488 -1.2183  0.0512  1.6588  3.2207

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  18.2793     0.7689  23.772 6.57e-14 ***
Heroin       10.6951     7.2949   1.466    0.162

Residual standard error: 2.202 on 16 degrees of freedom
Multiple R-squared: 0.1184,  Adjusted R-squared: 0.06333
F-statistic: 2.149 on 1 and 16 DF,  p-value: 0.162
```

```
          Pearson's product-moment correlation

data:  Any and Heroin
t = 1.4661, df = 16, p-value = 0.162
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.1462233  0.6987440
sample estimates:
      cor
0.3441403
```

Any using All Five as Predictors

```
lm(formula = Any ~ Marijuana + Cocaine + Crack + Heroin + Hallucinogens)

Residuals:
     Min       1Q   Median       3Q      Max
-0.80401 -0.20451  0.08643  0.22874  0.40055

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)     2.0358     0.8577   2.374 0.035169 *
Marijuana       0.9117     0.0577  15.801 2.14e-09 ***
Cocaine         1.2519     0.2817   4.444 0.000802 ***
Crack          -1.0761     0.8828  -1.219 0.246259
Heroin         -0.6960     1.3872  -0.502 0.624906
Hallucinogens  -0.2525     0.2079  -1.215 0.247897

Residual standard error: 0.3722 on 12 degrees of freedom
Multiple R-squared: 0.9811,  Adjusted R-squared: 0.9732
F-statistic: 124.7 on 5 and 12 DF,  p-value: 6.496e-10
```

ANOVA using All Five as Predictors

```
Analysis of Variance Table

Response: Any
              Df Sum Sq Mean Sq  F value    Pr(>F)
Marijuana      1 79.634  79.634 574.9580 1.662e-11 ***
Cocaine        1  6.331   6.331  45.7116 2.012e-05 ***
Crack          1  0.146   0.146   1.0559    0.3244
Heroin         1  0.020   0.020   0.1451    0.7099
Hallucinogens  1  0.204   0.204   1.4751    0.2479
Residuals     12  1.662   0.139
```

Any using Two Most Significant as Predictors

```
lm(formula = Any ~ Marijuana + Cocaine)

Residuals:
     Min       1Q   Median       3Q      Max
-0.61449 -0.26816  0.08714  0.26458  0.56238

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.96941    0.77327   2.547   0.0223 *
Marijuana    0.86480    0.04949  17.476 2.21e-11 ***
Cocaine      1.38881    0.20318   6.835 5.65e-06 ***

Residual standard error: 0.3681 on 15 degrees of freedom
Multiple R-squared: 0.9769,  Adjusted R-squared: 0.9738
F-statistic: 317.2 on 2 and 15 DF,  p-value: 5.333e-13
```

Young Adult

Marijuana

```
lm(formula = Any ~ Marijuana)

Residuals:
     Min       1Q   Median       3Q      Max 
-1.19582 -0.43680  0.07032  0.26508  1.10230 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  -3.1692     1.8059  -1.755   0.0984 .
Marijuana     1.3354     0.1175  11.370 4.48e-09

Residual standard error: 0.6028 on 16 degrees of freedom
Multiple R-squared: 0.8899,  Adjusted R-squared: 0.883 
F-statistic: 129.3 on 1 and 16 DF,  p-value: 4.476e-09

        Pearson's product-moment correlation

data:  Any and Marijuana 
t = 11.3699, df = 16, p-value = 4.476e-09
alternative hypothesis: true correlation is not equal to 0 
95 percent confidence interval:
 0.8514388 0.9790237 
sample estimates:
      cor 
0.9433261 
```

Cocaine

```
lm(formula = Any ~ Cocaine)

Residuals:
    Min      1Q  Median      3Q     Max 
-2.6994 -0.3985  0.1106  0.5897  1.8752 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  10.3083     1.4664   7.030 2.84e-06 ***
Cocaine       3.7455     0.7719   4.852 0.000176 ***

Residual standard error: 1.155 on 16 degrees of freedom
Multiple R-squared: 0.5954,  Adjusted R-squared: 0.5701 
F-statistic: 23.54 on 1 and 16 DF,  p-value: 0.0001765
```

```
        Pearson's product-moment correlation

data:  Any and Cocaine
t = 4.8523, df = 16, p-value = 0.0001765
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.4763543 0.9104894
sample estimates:
      cor
0.7716196
```

Crack

```
lm(formula = Any ~ Crack)

Residuals:
    Min      1Q  Median      3Q     Max
-2.3333 -1.7708  0.4667  1.5167  2.5167

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   18.133      2.499   7.255 1.92e-06 ***
Crack         -2.500      7.388  -0.338     0.74

Residual standard error: 1.81 on 16 degrees of freedom
Multiple R-squared: 0.007105,	Adjusted R-squared: -0.05495
F-statistic: 0.1145 on 1 and 16 DF,  p-value: 0.7395

        Pearson's product-moment correlation

data:  Any and Crack
t = -0.3384, df = 16, p-value = 0.7395
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.5302925  0.3982515
sample estimates:
        cor
-0.08429095
```

Hallucinogens

```
lm(formula = Any ~ Hallucinogens)

Residuals:
    Min      1Q  Median      3Q     Max
-2.4828 -0.9525  0.4172  0.7391  2.7414
```

```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)     22.249      1.442   15.43 5.01e-11 ***
Hallucinogens   -4.242      1.205   -3.52  0.00284 **

Residual standard error: 1.363 on 16 degrees of freedom
Multiple R-squared: 0.4364,  Adjusted R-squared: 0.4012
F-statistic: 12.39 on 1 and 16 DF,  p-value: 0.002841

        Pearson's product-moment correlation

data:  Any and Hallucinogens
t = -3.52, df = 16, p-value = 0.002841
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.8617222 -0.2801780
sample estimates:
       cor
-0.6606328
```

Heroin

```
lm(formula = Any ~ Heroin)

Residuals:
    Min      1Q  Median      3Q     Max
-2.4616 -1.4616 -0.0028  1.5634  2.6384

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  16.5704     0.8172  20.278 7.73e-13 ***
Heroin        6.9120     6.6720   1.036    0.316

Residual standard error: 1.758 on 16 degrees of freedom
Multiple R-squared: 0.06286,     Adjusted R-squared: 0.004289
F-statistic: 1.073 on 1 and 16 DF,  p-value: 0.3156

        Pearson's product-moment correlation

data:  Any and Heroin
t = 1.036, df = 16, p-value = 0.3156
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.2448061  0.6423949
sample estimates:
      cor
0.2507193
```

All Five as Predictors

```
lm(formula = Any ~ Marijuana + Cocaine + Crack + Heroin + Hallucinogens)

Residuals:
    Min       1Q   Median       3Q      Max
-0.65075 -0.30604 -0.00609  0.10864  1.09283

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)     1.5055     2.5261   0.596   0.5623
Marijuana       1.0142     0.1401   7.239 1.03e-05 ***
Cocaine         0.9230     0.4985   1.852   0.0888 .
Crack          -1.1461     2.1288  -0.538   0.6002
Heroin          1.1554     2.0041   0.576   0.5749
Hallucinogens  -1.0405     0.5949  -1.749   0.1058

Residual standard error: 0.4992 on 12 degrees of freedom
Multiple R-squared: 0.9433,  Adjusted R-squared: 0.9197
F-statistic: 39.96 on 5 and 12 DF,  p-value: 4.500e-07
```

ANOVA of All Five Variables

```
Analysis of Variance Table

Response: Any
              Df Sum Sq Mean Sq  F value    Pr(>F)
Marijuana      1 46.967  46.967 188.4855 1.065e-08 ***
Cocaine        1  2.028   2.028   8.1402   0.01454 *
Crack          1  0.012   0.012   0.0486   0.82916
Heroin         1  0.020   0.020   0.0807   0.78118
Hallucinogens  1  0.762   0.762   3.0587   0.10581
Residuals     12  2.990   0.249
```

Marijuana and Cocaine as Predictors

```
lm(formula = Any ~ Marijuana + Cocaine)

Residuals:
    Min       1Q   Median       3Q      Max
-0.53909 -0.39796 -0.07294  0.28163  1.22486

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  -1.7800     1.5827  -1.125   0.2784
Marijuana     1.0901     0.1306   8.345  5.1e-07 ***
Cocaine       1.2700     0.4479   2.835   0.0125 *
```

Residual standard error: 0.5023 on 15 degrees of freedom
Multiple R-squared: 0.9283, Adjusted R-squared: 0.9187
F-statistic: 97.1 on 2 and 15 DF, p-value: 2.61e-09

Budget vs. Drug Use

Correlation between budget and average use of all drugs

Pearson's product-moment correlation

data: budget$budget and average$Any
t = 1.2888, df = 16, p-value = 0.2158
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.1869729 0.6766574
sample estimates:
      cor
0.3066667

Correlation between budget and marijuana use

Pearson's product-moment correlation

data: budget$budget and average$Marijuana
t = 1.0025, df = 16, p-value = 0.331
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.2524080 0.6376112
sample estimates:
      cor
0.2431106

Correlation between budget and hallucinogen use

Pearson's product-moment correlation

data: budget$budget and average$Hallucinogens
t = -3.4133, df = 16, p-value = 0.003559
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.8564385 -0.2614879
sample estimates:
       cor
-0.6491136

Correlation between budget and use

Pearson's product-moment correlation

data: budget$budget and average$Cocaine
t = 3.35, df = 16, p-value = 0.004067
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.2501983 0.8531854
sample estimates:
      cor
0.6420683

Correlation between budget and heroin use

Pearson's product-moment correlation

data: budget$budget and average$Heroin
t = 0.4674, df = 16, p-value = 0.6465
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.3708991 0.5529744
sample estimates:
      cor
0.1160698

Budget as response, all drugs as predictor

lm(formula = budget$budget ~ average$Any)

Residuals:

Min	1Q	Median	3Q	Max
-625.7	-380.8	-188.6	389.9	989.6

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	296.60	988.79	0.300	0.768
average$Any	71.98	55.85	1.289	0.216

Residual standard error: 537.6 on 16 degrees of freedom
Multiple R-squared: 0.09404,   Adjusted R-squared: 0.03742
F-statistic: 1.661 on 1 and 16 DF, p-value: 0.2158

Budget as response, most significant drugs from previous section as predictors

lm(formula = budget$budget ~ average$Marijuana + average$Cocaine +
    average$Hallucinogens)

Residuals:

Min	1Q	Median	3Q	Max
-451.50	-120.03	-48.32	32.11	767.19

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	994.93	518.71	1.918	0.07573	.
average$Marijuana	62.41	66.35	0.941	0.36284	
average$Cocaine	651.03	491.28	1.325	0.20634	
average$Hallucinogens	-770.23	216.49	-3.558	0.00315	**

Residual standard error: 304.9 on 14 degrees of freedom
Multiple R-squared: 0.745,   Adjusted R-squared: 0.6903
F-statistic: 13.63 on 3 and 14 DF, p-value: 0.0001943

ANOVA to correspond linear model from above

Analysis of Variance Table

Response: budget$budget

	Df	Sum Sq	Mean Sq	F value	Pr(>F)	
average$Marijuana	1	301677	301677	3.2445	0.0932348	.
average$Cocaine	1	2323858	2323858	24.9929	0.0001948	***
average$Hallucinogens	1	1177004	1177004	12.6586	0.0031512	**
Residuals	14	1301731	92981			

Budget as response, all five drugs as predictors

lm(formula = budget$budget ~ average$Marijuana + average$Cocaine +
average$Crack + average$Heroin + average$Hallucinogens)

Residuals:

Min	1Q	Median	3Q	Max
-335.38	-94.57	-36.06	123.80	534.62

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	893.27	562.04	1.589	0.13797	
average$Marijuana	174.89	73.34	2.385	0.03447	*
average$Cocaine	878.22	512.13	1.715	0.11206	
average$Crack	-4085.92	1476.63	-2.767	0.01705	*
average$Heroin	1097.15	1921.77	0.571	0.57860	
average$Hallucinogens	-776.78	235.79	-3.294	0.00641	**

Residual standard error: 253.7 on 12 degrees of freedom

Multiple R-squared: 0.8486, Adjusted R-squared: 0.7856

F-statistic: 13.45 on 5 and 12 DF, p-value: 0.0001432

References:

- U.S. Department of Health and Human Services. *Monitoring the Future: National Results on Adolescent Drug Use, Overview of Key Findings 2009.* Bethesda, Maryland: National Institute of Drug Abuse, 2009.
- "DEA Arrests." http://www.justice.gov/dea/statistics.html**.**
- **"**DEA Seizures." http://www.justice.gov/dea/statistics.html.