

STAT 225 Midterm Exam 1 Feb. 1 2001

Name:

Check your section below

Check one	Division	Section	Instructor	Time
	01	01	Kuiper	8:30
	02	01	Kuiper	10:30
	03	01	Johnson	11:30
	04	01	Johnson	12:30
	04	02	Bogdan	12:30
	05	01	Tindel	10:30
	06	01	Lee	12:00
	07	01	Tindel	1:30
	08	01	Florescu	3:00

- There are 5 problems, each worth between 15 and 25 points.
- Before you start, make sure your exam is not missing any page.
- You may do the problems in any order you like.
- You can earn lots of partial credits if you show your work.
- You are allowed one page of notes (both sides) and a calculator.

For instructor's use only

Problem	Points	Score
1	20	
2	20	
3	15	
4	20	
5	25	
Total	100	

1. Let A and B be events in S with $P(A) > 0$ and $P(B) > 0$. Circle ALL of the statements below which are ALWAYS TRUE.

(a) $P(AB) = 0$ when A and B are independent.

(b) $P(A \cup B) = P(A) + P(B) - P(A | B)P(B)$.

(c) $P(AB) = 0$ when A and B are mutually exclusive.

(d) $P(A | B) = P(B | A)P(A)/P(B)$

(e) $P(A) = P(A\bar{B}) + P(AB)$

(f) $P(A \cup B) = P(A) + P(B)$ if A and B are independent.

(g) $P(\bar{A}) \leq P(AB)$.

(h) $P(\overline{A \cup B}) = P(\bar{A}\bar{B})$.

2. A six-card hand is dealt from an ordinary 52-cards deck of cards (recall there are 4 colours and 13 numbers of each colour in a regular 52-cards deck).

(a) Define the sample space S . Give its size. For all $A \subset S$, give a reasonable value for $P(A)$.

(b) Find the probability that all six cards are hearts.

(c) Find the probability that there are three aces, two kings, and one queen.

3. There are two boxes, the odd box containing 1 black marble and 3 white marbles, and the even box containing 2 black marbles and 4 white marbles. A box is selected at random, and a marble is drawn at random from the selected box.

(a) What is the probability that the marble is black ?

(b) Given the marble is white, what is the probability that it came from the even box ?

4. An Insurance company has offices in Lafayette, New York and Atlanta. It hires 12 new actuaries and sends 5 to Lafayette, 4 to New York and 3 to Atlanta.
- a) How many ways can this be done.

b) One person refuses to accept unless he/she is assigned to Lafayette. If assignments are random, what is the probability that this person refuses.

5. Brad, Kiseop and Ionut each have 50 students in their STAT225 class. In Brad's class, 25 are male and 25 are female. In Kiseop's class 40 are male and 10 are female. In Ionut's class 20 are male and 30 are female. From the total of 150 students one is selected at random.

(a) What is the probability the selected student was male?

(b) Let M be the event the selected student was a male and I be the event that the student was from Ionut's class. Are these two events independent? (Yes/No will not receive credit, you must give a reason).

(c) Given the student selected was a female, what is the probability that the student was in Kiseop's class.