CPE 390: Microprocessor Systems

HW6
Due: 4/12/2018

1. Suppose we wish to attach a keyboard to an HCS12 microcontroller. We want to set it up so that whenever the user strikes a key on the keyboard, it will interrupt the microprocessor and store the ASCII value output by the keyboard into an 8-bit memory location whose label is *key_code*. We connect the keyboard to the microprocessor using the configuration shown in slide 18 of Lecture 11. The 8-bit data output from the keyboard is connected to port T. The "new data ready" (NDR) signal from the keyboard is connected to PP0. When the user depresses a key, the new ASCII value appears on the keyboard output after which NDR goes high. When the key is released, the keyboard output is unchanged and NDR goes low.

   (a) Assuming that the interrupt service routine is labeled *key_int* and the location of the port P interrupt vector in the Interrupt vector Table is $FF8E; write an instruction sequence that will set up the ports and the interrupt system to achieve this functionality. (For this problem, I want you to make no assumptions about the initial values of the various I/O registers associated with ports P and T. Make sure you set up all registers that will affect the correct operation of your code)

   (b) Write the interrupt service routine *key_int*. (You can assume that no other peripherals are interrupting using Port P)

2. Using the hardware setup shown in slide 23 of Lecture 11, write code to generate the following repetitive waveform from pin V_{OUTB} of the D/A converter. (Output voltages don't need to be exact, just pick closest code to correct value). You can assume there is a subroutine *waitfor1ms* available.