EE 337: Microprocessors Lab
Quiz 2 - Bonus

2^{nd} October, 2016

This question is a bonus question, to be done with Quiz 2. If you complete this, you can skip this week's lab session. When you are done demonstrate your solution to us. You also have to give a copy of your code to the RA.

Your code should be as clean and readable as possible. Use subroutines to break down the problem into sub-problems.

UART emulator

Write a function `uart_emulator()` that can emulate the UART peripheral of a micro-controller. The function should be able to carry out the following tasks:

- Take an unsigned character as input (argument)
- Generate a baud-rate using any one of the on-board timers (T0-T2)
- Calculate the parity of the input character
- Generate `Hi(1)` or `Lo(0)` signals corresponding to the start-bit `(Lo)`, the bits of the binary representation of the character, the parity-bit, and the stop-bit `(Hi)` on one of the port pins (say P1.7). The sequence should be:

  $$[\text{start-bit} \quad bit0 \quad bit1 \quad \cdots \quad bit6 \quad bit7 \quad \text{parity-bit} \quad \text{stop-bit}]$$

  in accordance with the UART convention. Each bit should be held `Hi` or `Lo` on the port pin depending on the baud-rate interval.

The character sent using this procedure should be received on the UART peripheral present on the AT89C5131A micro-controller and interpreted correctly. For this, connect P1.7 to P3.0 (the UART receive pin), configure the baud-rate of the peripheral correctly, and check the UART interrupt for the RI flag. You should also check the parity bit to check the integrity of the data. If the character sent matches the character received, display "Success" on the LCD display.