CmpE213 – Digital Systems Design

Homework 9

Timers/counters and serial communication

1. MacKenzie, chapter 4, problem 8. Please email me the program with the subject line "Hwk9 - Problem 1". Be sure to include your name in the emailed file. Please also turn in a hardcopy of your code.

2. Write a short C-program which writes 1 byte of data to the serial port.

   - Send 8 bits of data and a 9th "parity" bit (Look in PSW for parity).
   - Send data at 5,280 baud assuming a 4.2MHz clock
   - Send a single byte, 0x79

3. For the above problem, show the signal that would result on TxD. Please calculate the time-interval, T, over which each bit is sent and show this on your plot. Remember that the PSW calculates even parity – if the ACC has an odd number of "1"s, parity will be 1, making total number of "1"s an even number.

4. Say we wanted to use an 8051 to measure the number of revolutions of a wheel when the antilock brake system was active. We have 2 sensors: sensor A, which produces a logical '1' when the antilock brakes are active, and sensor B, which produces a single pulse every time the wheel completes a single revolution. You want to count the pulses from sensor B whenever sensor A is producing a 1. Explain briefly how you would set up a timer/counter and the 8051 to measure the number of revolutions of the wheel. Draw a schematic showing how the sensors are connected to the 8051.