1. Write the c-code to show how to send the most significant 8-bits of a floating point number, $f$, to the D/A converter. You may assume that $0.0 < f < 100.0$

2. If Timer 0 is initialized to 0 and is set up as a 8-bit auto-reload timer what is the maximum time before time out that we can get using the AT89C51CC03 with a 24 MHz clock crystal? Show your calculations and give an answer in microseconds.

3. A c-code main program calls an external assembly language program and passes it two unsigned char parameters as shown below: When the assembly code runs what is the starting value in R4, R5, R6, and R7?

   ```c
   extern int Assem(int, unsigned char);
   void main (void)
   {
   unsigned char x, y;
   x = 0x56;
   y = 0x35;
   KInt = Assem(x, y);
   while(1);
   }
   ```

   R4 = ______
   R5 = ______
   R6 = ______
   R7 = ______

4. Suppose you have an AT89C51CC03 processor with a 12 MHz crystal that is running in the single clock mode. If we set up T0 in the 8-bit auto-reload mode, what value should be loaded into TH0 to produce a 100 μsec delay.

5. Write a single line of c-code which will invert all of the bits on P3.
6. In the system below a normally open push button is attached to P1.6 and a SPST switch is tied to P1.7. An LED is tied to P3.2. Write a C program which does the following:
   A) if the switch on P1.7 is open turn the LED ON while the push button is closed.
   B) if the switch on P1.7 is closed turn the LED on while the push button is open.
   Your program should run in a forever loop.

7. Write a program in c-code to do an input from port 1, complement the data, swap the nibbles, and copy the result to port 3.

8. Suppose that P1 and P2 together hold 12 bits of data with the 8 most significant bits in P2 and the 4 least significant bits are in the upper nibble of P1. Write the c-code to input this 12 bit number to an integer called x.

9. The result of a floating point calculation produces a number x in the range \(-3 \leq x \leq 17\). Write the scaling equation so that this number can be sent out to the D to A converter on the AT89C51AC3 and produce voltage values between 0 volts and 3.3 volts.
10. The following array declaration has been done as part of the spinning display project for the upper case letters. Each line represents a dot pattern for a single letter where the letter is marked as a comment on the right side. Write a function called DisplayDots which will receive a single capital letter and will send the five dot patterns to P2. For example, if the function is called using DisplayDots('C'); it would send the data 0x00, 0x7E, 0x7E, 0x7E, 0x7E to P2. You may ignore timing issues for this problem. The function is started for you below.

code unsigned char upper[] = {
  0xE0, 0x97, 0x77, 0x97, 0xE0,   //A
  0x00, 0x5E, 0x5E, 0x5E, 0xA1,   //B
  0x00, 0x7E, 0x7E, 0x7E, 0x7E,   //C
  0x00, 0x7E, 0x7E, 0x7E, 0xC3,   //D
  0x00, 0x6E, 0x6E, 0x6E, 0x6E,   //E
  0x00, 0x6E, 0x6E, 0x7F, 0x7F,   //F
  0x00, 0x7E, 0x7E, 0x6E, 0x60,   //G
  0x00, 0xEF, 0xEF, 0xEF, 0x00,   //H
  0x70, 0x7E, 0x7E, 0x00, 0x7F,   //I
  0x00, 0x7E, 0x7E, 0x7D, 0xFE,   //J
  0x0E, 0x6E, 0x6E, 0x6E, 0x60,   //K
  0x7F, 0x7F, 0x00, 0x7F, 0x7F,   //L
  0x00, 0x7E, 0x7E, 0x7D, 0x7F,   //M
  0x00, 0x6F, 0x6F, 0x6F, 0x0F,   //N
  0x81, 0xBD, 0xB5, 0x81, 0xFE,   //O
  0x7E, 0xBD, 0xC0, 0xBD, 0x7E,   //P
  0x7F, 0xFF, 0xFF, 0xFF, 0xFE,   //Q
  0x7E, 0x7E, 0x7E, 0x7E, 0x7E,   //R
  0x7F, 0x7F, 0x7F, 0x7F, 0x7F,   //S
  0x00, 0x7E, 0x7E, 0x7E, 0x7E,   //T
  0x00, 0x6E, 0x6E, 0x6E, 0x6E,   //U
  0x7F, 0x7F, 0x7F, 0x7F, 0x7F,   //V
  0x7E, 0x7E, 0x7E, 0x7E, 0x7E,   //W
  0x7C, 0x7A, 0x76, 0x6E, 0x3E\}   //Z

void DisplayDots(char c)
{