E85: Digital Design and Computer Engineering
Problem Set 8

1) Assembly Language Programming
   Translate the following code snippet into ARM assembly language.

   unsigned int a[10]; // assume base address of a is in R4
   unsigned int tmp; // assume tmp is in R5
   int i, j; // assume i and j are in R6 and R7, respectively

   for (i=1; i<10; i++)
       for (j=0; j<i; j++)
           if (a[i] > a[j]) {
               tmp = a[i];
               a[i] = a[j];
               a[j] = tmp;
           }

2) Writing a Function in Assembly Language
   Do Exercise 6.25(a) from the textbook.

3) Assembly Language to Machine Language
   Translate the following assembly language code to ARM machine language:

   Loop
   CMP R1, R2
   BEQ Done
   ADD R1, R1, #1
   B Loop
   Done

4) Machine Language to Assembly Language
   Translate the following machine language code to ARM assembly language:

   E7901102
   B381302A

5) Impact on Society: ARM typically collects a royalty of 1-2% of the selling price of a chip that includes one or more ARM processors. Suppose you design your own ARM-compatible processor from scratch and put it on a chip that you sell. Can ARM demand royalties? If so, on what grounds would their demand be enforceable in court?

How long did you spend on this problem set? This will not count toward your grade but will help calibrate the workload.