SI232 – Homework #3 (Chapter 3)

Due: Wed March 1, 2006

Problem numbers refer to the text, 3rd edition.

NOTE: You *could* use a calculator to help with the first four problems. However, all of these are small enough that you should be able to do this by hand on a quiz/test, where calculators are not permitted. Show your work.

A. (15 pts) Convert 257_{ten} into:
    1. a 32-bit two's complement binary number.
    2. a single precision floating point number (show result in binary)
B. (10 pts) Convert -511_{ten} into a 32-bit two's complement binary number.
C. (10 pts) Problem 3.4 from text
D. (10 pts) Problem 3.5 from text
E. (10 pts) Suppose we use 8 bits to represent a two's complement binary number. What are the largest and smallest numbers that can be represented? (give your answers as decimal numbers)
F. (20 pts) Convert the following C code into MIPS. A C float is stored as a MIPS single precision floating point value.

```
float dotproduct (float A[], float B[]) {
     float sum = A[0] * B[0];
     int ii;
     for (ii = 1; ii < 20; ii++) {
          sum = sum + A[ii] * B[ii];
     }
     return sum;
}
```

G. (15 pts) Convert the following C code into MIPS. Argument 'x' is passed in register $f12 and 'y' is passed in register $f14.

```
float function2 (float x, float y) {
     if (x > y)
          return x + y;
     else
          return x – y;
}
```

H. (EXTRA CREDIT - max 10 pts) Problem 3.7 from text – This is asking you to convert the pseudo instruction "abs $t2, $t3" into a sequence of real MIPS instructions. The best solution will have only three instructions (some of which may be pseudoinstructions themselves), but partial credit for longer sequences.