Problem Set #6

Date Assigned: Friday, April 22, 2016
Date Due: Monday, May 2, 2016 @ 9:15am
Points: 50 pts

1. (9 pts) Complete question 13.4 on page 480.

2. (10 pts) Consider an ***arithmetic*** right shift.
    a. Show how to use an arithmetic right shift in C++. Write some example code that outputs a hex value, shifts that value to the right twice, and then outputs the new value. Copy the code and output to your solutions document.
    b. Show how to use an arithmetic right shift in x86 assembly. Write some example code that takes a hex value, and shifts that value to the right twice. Take a screenshot of the register screen before and after the shift. Copy the code to your solutions document.

3. (14 pts) The first few fibonacci numbers are 1 1 2 3 5 8 ... After the first two, the remaining fibonacci numbers are found by adding the two previous fibonacci numbers (e.g. 8 = 3 + 5). Using Visual Studio 2013, write an inline assembly language program that returns the nth fibonacci number. A skeleton of the code is provided here. You must use the skeleton code in your solution. Do not add any more variables to the program. Paste the code below, and submit the C++ file to Grace. Name your C++ file (fibPUNet.cpp). You must follow the coding standards.

```cpp
#include <iostream>

int fib (int n)
{
   __asm
   {
    ; your code goes here
    }

}

using namespace std;

int main (void)
{
   char ch;

   for (int i = 1; i < 10; ++i)
   {
     cout << "fib number " << i << " = " << fib (i) << endl;
   }

   cin >> ch;

   return 0;
}
```

4. (8 pts) Complete question 14.9 on page 528.

5. (9 pts) CPI stands for clock cycles per instruction and is the number of cycles needed to execute a particular instruction.

    a. If we reduce the clock cycle time in a particular processor from C to 0.8C and each instruction takes the same number of cycles, what is the speedup?

    b. If we reduce the clock cycle time from C to 0.8C and 20% of the instructions need an extra cycle, what is the speedup?

    c. If we leave the clock cycle time the same, but change the average CPI for 40% of the instructions from 5 to 4, (leaving the average CPI for the remaining instructions at 5), what is the speedup?

How to turn in your solution:

- Create a folder called 06punet, and place inside it: (1) your word document 06punet.docx and (2) your C++ file (fibPUNet.cpp). Submit the folder by placing it into the CS 430 drop folder on Grace by the deadline. Make sure that both of your programs follow the C++ coding standards. Be sure to explain in the comments at the top of each file how each program works.

- Please make sure your problem sets are typed, answered in order, and stapled together. A hard copy of your Problem Set Solution is due on the instructor's desk by the deadline.