Instructions

Please begin your answer to every problem on a new sheet of paper. Be as concise and clear as you can. Make an effort to be legible. To avoid misplacement of the various components of your assignment, make sure that all the sheets are stapled together. You may discuss problems with your classmates, but all solutions must be written up independently.

This homework will help you to advance your ability to apply knowledge in computer engineering learned in the course and Knowledge of related topics in computer science discipline.

Problem 1 (20 points)
Construct a control flow graph (like the one shown in Figure 2.11 of Patterson and Hennessy’s textbook) for the following section of C or Java code:

```c
for (i=0; i<x; i=i+1)
    y = y + i;
```

You are also required to construct the control flow graph for its corresponding assembly code (Note: use the compiler that come together with SimpleScalar simulator to generate the assembly code).

Problem 2 (10 points)
Please answer the following questions:
(a) What binary number does the following hexadecimal number represent?

\[ 7FFFFFFA_{\text{hex}} \]

(b) What hexadecimal number does the following binary number represent?

\[ 1100\ 1010\ 1111\ 1110\ 1111\ 1010\ 1100\ 1110_{\text{two}} \]

Problem 3 (20 points)
Do the Problem 2.15 in Patterson and Hennessy’s textbook (see page 149).

Problem 4 (20 points)
Do the Problem 2.30 in Patterson and Hennessy’s textbook (see page 150).

Problem 5 (15 points)
Do the Problem 2.32 in Patterson and Hennessy’s textbook (see page 151).

Problem 6 (15 points)
Do the Problem 2.38 in Patterson and Hennessy’s textbook (see page 152).
**Bonus**
Imagine you are building a 128-bit system. Why could a carry look-ahead adder be detrimental to your design?

Look up the Manchester carry chain or the carry select adder and explain the advantages/disadvantages. Use Big O notation where possible.