Problem Set #3 - Due 02/26/02 Total 100

The purpose of this problem set is to:

- Help you become familiar with material covered in week 3 of class.

Please turn in each problem on a separate page. Each page should have your Name, email id, and the problem number clearly printed/written on it. Keep track of how long time it takes to complete each problem. The time taken for each problem should be printed on the first page. If you use more than one page for one problem, please STAPLE the pages together. You will loose points if you do not document the time taken for each problem, which at the same time means that you will get points for documenting "time taken" A template (in PDF form) is available on the web.

Problem 1 - 10 points

Chapter Review Problem 5, Page 100 in Brookshear.

Problem 2 - 10 points

Chapter Review Problem 8, Page 100 in Brookshear

Problem 3 - 10 points

Chapter Review Problem 31, Page 103 in Brookshear

Problem 4 - 10 points

1. Chapter Review Problem 34 Part a, Page 103 in Brookshear
2. Chapter Review Problem 34 Part b, Page 103 in Brookshear
3. Chapter Review Problem 34 Part d, Page 103 in Brookshear
4. Chapter Review Problem 35 Part a, Page 104 in Brookshear
5. Chapter Review Problem 35 Part c, Page 104 in Brookshear

Problem 5 - 30 points

1. Detail the algorithm needed to carry out the subtraction operation if you are allowed to perform only basic logic operations (AND, OR, XOR) and the ADD operation. Assume that both numbers are in 2's complement form.

2. Draw a circuit that does 4-bit subtraction. You can use the block diagram for a 1-bit adder (covered in recitation) and the basic gates (OR, AND, XOR).

3. Write a machine language program that computes A-B. Store the value of A in memory location labeled **first_number** and the value of B in memory location labeled **second_number**. Store the result in memory location F2. Implement your

algorithm in the machine language specified in Brookshear Appendix C. Your program should work for all possible values of A & B. Assume that both numbers are in two's complement form. Turn in a **hard copy** of your program and turn in your code **electronically**.

Problem 6 - 30 points

1. What is the "Shift and Add" multiplication algorithm? Detail the steps of the algorithm for implementing the "Shift and Add" multiplication algorithm in the machine language specified in Brookshear Appendix C.

2. Write the machine language code that implements your algorithm (Computes A*B). Store the value of A in memory location labeled **first_number** and the value of B in memory location labeled **second_number**. Store the result in memory location F2.Your program should work for all possible values of A&B. Turn in **a hard copy** of your program and turn in the code **electronically**.