Cpr E 381 Homework 4

So far you have only practiced assembly language for writing simple pieces of code. In this homework you will translate some higher-level language constructs as well as manage limited processor resources.

1. You have used branches for simple loops. In this section you will use branches to handle more complicated structures.
    a. Problem 2.10
    b. Problem 2.11
    c. Write the MIPS code for the following and report the best and worst case for the number of instructions executed in this block. Do not rearrange or alter the expression. Keep in mind that in C, as soon as a Boolean expression in an if statement is determined to be true, the remainder is not evaluated (i.e. if a == b then a > c and subsequent expressions are skipped). Order of operations is important (&& has higher precedence than ||).

```
if(a == b || a > c || b == c && b > a || c == 0){
        d = a + b;
}
else if(b == 1){
        d = a+c;
}
else{
        d = 0;
}
```

2. So far you have ignored the fact that there are a limited number of registers available within the MIPS processor. All the variables in your programs could be assigned directly to registers. In real programs the number of variable far exceeds the limited resources on the processor. An important mechanism to share registers is to use a stack. Review the stack operations from the lecture notes and the book and do the following problems.
    a. Problem 2.15
    b. Problem 2.16
    c. Problem 2.17
    d. Problem 2.18
    e. How much more memory is used to compute the 100^{th} Fibonacci number in 2.16 than in 2.17.