CS 313, Winter 2006 - Term 2
Assignment 5: HCL and y86
Assigned: February 26, Due: Sunday, March 4, 11:59PM (with the usual 13 hour grace period)
Instructions: Hand in all solutions on paper.

1. Write an HCL expression for a boolean signal `implies`, true whenever input `a` implies input `b`, using only the boolean operators `&&` (and), `||` (or), and `!` (not).

2. Write an HCL expression that accomplishes the sorting of 4 integer inputs. Since each HCL expression can have only one output, we will do this by defining 4 HCL expressions `sort0`, `sort1`, `sort2`, and `sort3`, each with 4 inputs `a`, `b`, `c`, and `d`. `sort0` should select the smallest element, `sort1` the next smallest and so forth with `sort3` selecting the largest element.

3. The Y86 instruction set only contains 4 arithmetic and logical instructions: `addl`, `subl`, `andl`, and `xorl`. Suppose you were converting an X86 program to Y86 and found that it used the `notl` (bitwise complement) instruction. How can you accomplish the effect of this instruction using only Y86 instructions? To make this specific, suppose that the instruction that you wanted to replace was:

   ```
   notl  %eax
   ```

   Give a sequence of Y86 instructions that have the identical effect. Feel free to use the `%ecx` or `%edx` registers if you need another register.

4. Repeat question 3 above but with the instruction `orl`. Specifically, accomplish the same effect as:

   ```
   orl   %ebx, %eax
   ```