Homework Assignment #1
Due: September 19, 3:30 p.m.

Along with your solutions to this assignment, hand in a *separate* sheet of paper containing your student number and the following declaration: "I have read and understood the policy on academic honesty on the CSE3101 course web page." Sign this paper and date it. Without this declaration, your solutions will not be marked.

1. You are given two sequences of n bits, $x_{n-1}, \ldots, x_0$ and $y_{n-1}, \ldots, y_0$. These are descriptions of two numbers in binary (*i.e.*, they define natural numbers $X = \sum_{i=0}^{n-1} x_i 2^i$ and $Y = \sum_{i=0}^{n-1} y_i 2^i$.) Your goal is to compare X and Y and output
1 if $X > Y$,
-1 if $X < Y$, or
0 if $X = Y$.

(a) Use a loop to solve this problem efficiently.

(b) Prove your algorithm is correct using a loop invariant.

(c) What is the worst-case running time of your algorithm? Explain why your answer is correct. You can give your answer using Θ notation.