Name:_____ Student Number:_____

CMPT 150 : TEST #2

Time: 50 minutes 30 MARKS
3 Questions 2 Pages (both sides)
A

INSTRUCTIONS

1. **ALL questions to be answered on the test paper.** The backs of pages can be used for rough work.
2. Place your name at the top of each page. No part of the test paper is to be removed from the lecture room.
3. CAUTION: In accordance with the Academic Honesty Policy (T10.02), academic dishonesty in any form will not be tolerated. Prohibited acts include, but are not limited to, the following:
   - making use of any books, papers, electronic devices or memoranda, other than those authorized by the examiners.
   - speaking or communicating with other students who are writing examinations.
   - copying the work of other candidates or purposely exposing written papers to the view of other candidates.

1. A combinational device has the following function table:

```
a b x | y
------|--
0 0 0 | 0
0 0 1 | 0
0 1 0 | 0
0 1 1 | 1
1 0 0 | 0
1 0 1 | 1
1 1 0 | 0
1 1 1 | 0
```

a. Show how to implement this device using a 4x1 MUX and one inverter. **(4 marks)**

b. (Question 1 continued) Demonstrate that this device is universal. **(6 marks)**

2. The following characteristic table describes a simple sequential circuit:

Q	x	Q+
0	0	0
0	1	1
1	0	1
1	1	0

a. Construct the excitation table for this circuit. **(2 marks)**

b. (Question 3 continued) Construct a logic diagram for the circuit that uses a RS flip-flop. **(4 marks)**

c. Construct a logic diagram for the circuit that uses a D flip-flop. **(4 marks)**

3. Using RS flip-flops, Construct a sequential circuit that generates the sequence 0, 1, 3, 2, and repeats. A new value is displayed on the rising edge of each clock enable input.