

Student ID: _____

CS 151 Quiz 2

Name : _____ , _____
(Last Name) (First Name)

Student ID : _____

Signature : _____

Instructions:

1. Please verify that your paper contains **6 pages** including this cover.
2. Write down your Student-Id on the top of each page of this quiz.
3. This exam is **closed book**. No notes or other materials are permitted.
4. Total credits of this midterm are **40 points**.
5. To receive credit you must show your work clearly.
6. **No re-grades will be entertained if you use a pencil.**
7. Calculators are **NOT** allowed.

Student ID: _____

Q1: [Mux/Decoder application]

[15 points]

For function $F(x,y,z) = xy'z + xyz' + x'y'z'$:

(a) Create the truth table (2 points)

(b) Implement **F** by means of a 4-to-1 multiplexer (5 points)

(HINT: You can use NOT gates to inverse the input to the MUX)

Student ID: _____

(c) A 3-to-8 decoder (4 points)

(d) Compare the two design in parts (b) and (c) based on the number of equivalent **2-input** gates (4 points)

(You don't have to count the number of NOT gates used in the input of MUX)

Student ID: _____

Q4: [FSM design]

[5 points]

Draw the FSM diagram for a counter that counts like this:

$7 \rightarrow 6 \rightarrow 5 \rightarrow 4 \rightarrow 3 \rightarrow 2 \rightarrow 1 \rightarrow 0 \rightarrow 7 \rightarrow 6 \dots\dots$

The counter should have an Enable input. When the Enable = 1 it counts as shown above, if Enable = 0, it stops counting.