**Ve270 Introduction to Logic Design Homework 3**

**Assigned: May 28, 2020**

**Due: June 4, 2020, 2:00pm.**

**A pop quiz will be given on the due date.**

1. Problem 2.57 (15 points)
2. Problem 2.58 (15 points)
3. Problem 2.60 (15 points)
4. Problem 2.74 (15 points)
5. Show how two 4-to-1 and one 2-to-1 MUXs could be connected to form an 8-to-1 MUX. Make sure the control signals are clearly connected and labeled. (5 points)
6. Show how to make a 5-to-1 MUX using an 8-to-1 MUX. (5 points)
7. Use one 4-to-1 MUX and one inverter to implement a digital circuit for following truth table. (5 points)

|  |  |  |  |
| --- | --- | --- | --- |
| a | b | c | F |
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 0 |

1. Use one 3-by-8 decoder and other components to implement a digital circuit for above truth table. (10 points)
2. An incrementor is a combinational circuit that always adds “1” to the input. Design a 4-bit incrementor with half-adder building blocks. (10 points)
3. Highlight the critical paths of the following circuit. Assume that each gate (including the individual inverters, NOR, and XNOR gates) has a delay of 2 ns and each wire has a delay of 1 ns. (5 points)

c