ECE 370: Digital Systems-Logic Design

Sample Test: Chapter 6-Part 3:
Demultiplexers and Parity Gnerators/Checkers
Spring 2005

Demultiplexers

1. What is the general purpose of a demultiplexer? Compare and contrast a DMUX with a MUX.

2. Describe how many inputs and outputs a demultiplexer contains if there are *n* select lines present.

3. Design a demultiplexer with three select lines using only gates. Now design a three input binary decoder. How are the two designs similar? How are they different? How can one device be modified to act as the other?

Parity Generators

4. Data is being sent through a PC Serial port to a modem on a desktop printer in groups of 7-bits plus a parity bit, *P*. For each of the following sets of data, what is the value of the parity bit if the parity scheme is EVEN? What is the value of the parity bit if the parity scheme is ODD?

a) 0110110*P* b) 1000000 *P* c) 0010101 *P* d) 0101010 *P* e) 1100110 *P*

5. The following data and parity bits are transmitted four times: *ABP* = 101. What parity scheme is being used?

6. Design the simplest digital system that generates an ODD parity bit, *P*, given you have two bits of binary data. Repeat the problem, this time using EVEN parity. Extend the design by adding a control line named $\overline{EVEN}$ / *ODD* to decide when to use one parity generation scheme over the other.

7. Design the simplest digital system that generates a desired parity scheme, either EVEN or ODD, for a four bit input binary data. What is the cost of the system? (*Try not using a truth table. Use Problem 6 as a guide.)*

8.. Design the simplest digital system that checks for ODD parity of two-bit binary data. Repeat the problem, this time checking for EVEN parity. Extend the design by adding a control line named $\overline{EVEN}$ / *ODD* to decide when to use one parity-checking scheme over another. What is the cost of each design?

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9. Design the simplest digital system that checks for errors in 4-bit binary data based on either EVEN or ODD parity. What is the cost of the system? (*Try not using a truth table. Use Problem 8 as a guide.)*

10. Describe any problems with the parity error-checking scheme. Specify instances when such a problem occurs.