

Homework 2 Solutions for Computer Logic and Circuit Design: PHYS306/COSC330

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1 3-1: The Inverter

- Exercise 1: See Fig. 1.

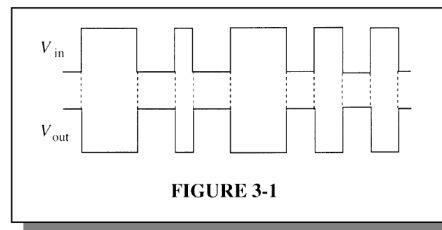


Figure 1: Solution for Exercise 1.

- Exercise 2: B) LOW C) HIGH D) LOW E) HIGH F) LOW

2 3-2: The AND Gate

- Exercise 5: See Fig. 2. Notice that $X = B$.

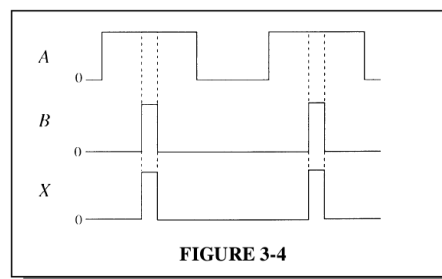


Figure 2: Solution for Exercise 5.

- Exercise 7: See Fig. 3. Notice that $X = C$.

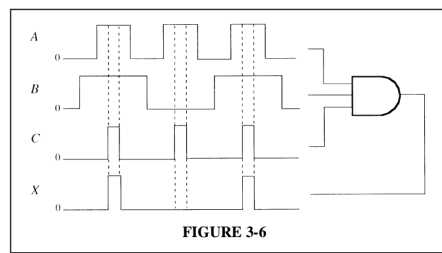


Figure 3: Solution for Exercise 7.

3 3-3: The OR Gate

- Exercise 11: See Fig. 4.

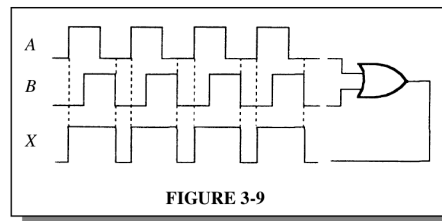


Figure 4: Solution for Exercise 11.

- Exercise 12: See Fig. 5.

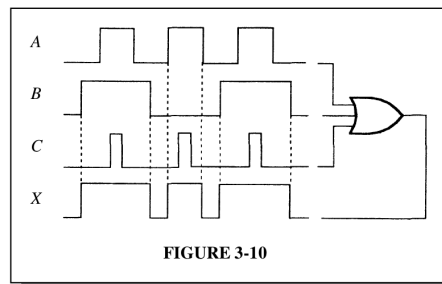


Figure 5: Solution for Exercise 12.

- Exercise 14: See Fig. 6.

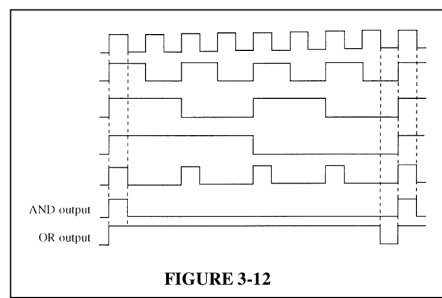


Figure 6: Solution for Exercise 14.

4 3-4: The NAND Gate

- Exercise 17: See Fig. 7. Notice that the output alternates between \bar{A} and $TRUE$.

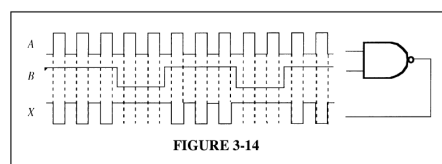


Figure 7: Solution for Exercise 17.

2. Exercise 18: See Fig. 8. Notice that the output alternates between \bar{C} and $TRUE$.

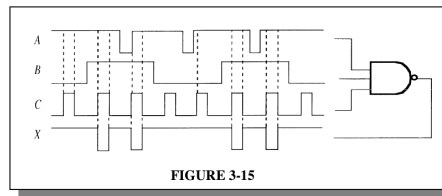


Figure 8: Solution for Exercise 18.

3. Exercise 19: See Fig. 9. Notice that the output is LOW only when all inputs are high.

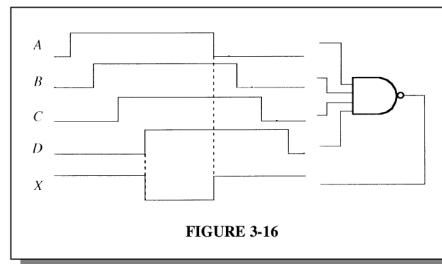


Figure 9: Solution for Exercise 19.

5 3-6: The Exclusive-OR and Exclusive-NOR Gates

1. Exercise 26: See Fig. 10. Notice that the output alternates between \bar{A} and A .

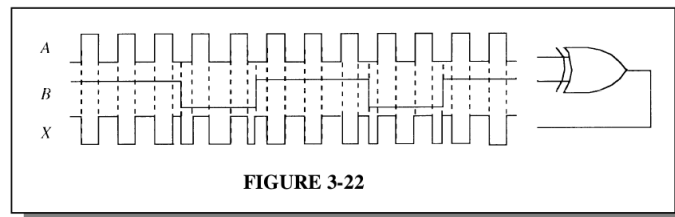


Figure 10: Solution for Exercise 26.

6 3-7: Programmable Logic

1. Exercise 29: The connections imply the following three outputs:

$$X_1 = \bar{A}B \quad (1)$$

$$X_2 = \bar{A}\bar{B} \quad (2)$$

$$X_3 = A\bar{B} \quad (3)$$

7 3-9: Troubleshooting

1. The gates are faulty in cases (a), (b), and (d). The gate in case (c) is functioning correctly.

8 Special Design Problems

1. Exercise 47: See Fig. 11. I would add Ignition Switch *AND* Lights Switch, and *XOR* that output with the timer output.

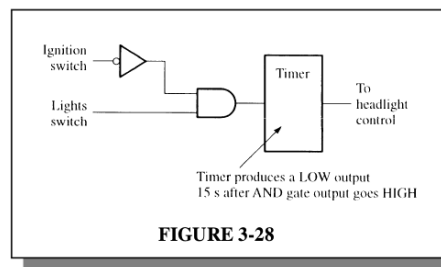


Figure 11: Solution for Exercise 47.