

CPE 201 – Introduction to Computer Engineering

Fall 2007

Homework 2

Due date: October 2, 2007

1. [10 points] Let variables T represent being tall, H being heavy and F being fast. Let's consider anyone who is not tall as short, not heavy as light and not fast as slow. Write a Boolean equation to represent the following:

a) You may ride a particular amusement park ride only if you are either tall and light, or short and heavy.

b) You may NOT ride an amusement park ride if you are either tall and light, or short and heavy. Use algebra to simplify the equation to sum of products.

c) You are eligible to play on a particular basketball team if you are tall and fast, or tall and slow. Simplify this equation.

d) You are NOT eligible to play on a particular football team if you are short and slow, or if you are light. Simplify to sum of products form.

e) You are eligible to play on both the basketball and football teams above, based on the above criteria. Hint: combine the two equations into one equation by AND-ing them.

2. [10 points]

(a) [5 points] Exercise 2.4 – only parts (a) and (c) (page 66).

(b) [5 points] Exercise 2.9 – only parts (b) and (c) (page 66). **Note:** give your result in sum-of-products form.

3. [10 points]

(a) [5 points] Exercise 2.20 (page 68).

(b) [5 points] Exercise 2.23 – only parts (b) and (d) (page 68).

4. [10 points] Exercise 2.17 – only parts (b) and (d) (page 67).

Extra credit:

1. [10 points] A museum has three rooms, each with a motion sensor (m_0 , m_1 , and m_2) that outputs 1 when motion is detected. At night, the only person in the museum is one security guard who walks from room to room. Create a circuit that sounds an alarm (by setting an output A to 1) if motion is ever detected in more than one room at a time (i.e., in two or three rooms), meaning there must be an intruder or intruders in the museum. Start with a truth table.