

Homework 3

Due September 24, 2013

CMSC 203

1. Section 1.6, Exercise 4 (*modified*)

What rule of inference is used in each of these arguments?

- a) Kangaroos live in Australia. Kangaroos are marsupials. Therefore, kangaroos are Australian and marsupials.
- b) It is either hotter than 100 degrees today or the pollution is dangerous. It is less than 100 degrees outside today. Therefore, the pollution is dangerous.
- c) Linda is an excellent swimmer. If Linda is an excellent swimmer, then she can work as a lifeguard. Therefore, Linda can work as a lifeguard.
- d) If I work all night on this homework, then I can answer all the exercises. If I answer all the exercises, I will understand the material. Therefore, if I work all night on this homework, then I will understand the material.

2. Section 1.7, Exercise 2

Use a direct proof to show that the sum of two even integers is even. .

3. Section 1.7, Exercise 18

Prove that if n is an integer and $3n + 2$ is even, then n is even using

- a) a proof by contraposition.
- b) a proof by contradiction.

4. Section 1.7, Exercise 22

Show that if you pick three socks from a drawer containing just blue socks and black socks, you must get either a pair of blue socks or a pair of black socks.

5. Section 1.8, Exercise 4

Use a proof by cases to show that $\min(a, \min(b, c)) = \min(\min(a, b), c)$ whenever a , b , and c are real numbers.

6. Section 1.8, Exercise 8

Prove that there is a positive integer that equals the sum of the positive integers not exceeding it. Is your proof constructive or nonconstructive?

Note: "Not exceeding" means all the positive numbers less or equal to that number

7. Section 1.8 Exercise 16

Show that if a , b , and c are real numbers and $a \neq 0$ then there is a unique solution of the equation $ax + b = c$.