

# Homework 7

## Due October 31, 2013

CMSC 203

1. Section 6.1, Exercise 4  
A particular brand of shirt comes in 12 colors, has a male version and a female version, and comes in three sizes for each sex. How many different types of this shirt are made?
2. Section 6.1, Exercise 16  
How many strings are there of four lowercase letters that have the letter “x” in them?
3. Section 6.1, Exercise 28  
How many license plates can be made using either three digits followed by three uppercase English letters, or three uppercase English letters followed by three digits?
4. Section 6.2, Exercise 8  
Show that if  $f$  is a function from  $S$  to  $T$ , where  $S$  and  $T$  are finite sets with  $|S| > |T|$ , then there are elements  $s_1$  and  $s_2$  in  $S$  such that  $f(s_1) = f(s_2)$ , or in other words,  $f$  is not one-to-one.
5. Section 6.2, Exercise 14
  - a) Show that if seven integers are selected from the first 10 positive integers, there must be at least two pairs of these integers with the sum of 11.
  - b) Is the conclusion in part (a) true if six integers are selected rather than seven?
6. Section 6.2, Exercise 34  
Assuming that no one has more than 1,000,000 hairs on the head of any person and that the population of New York City was 8,008,278 in 2010, show there had to be at least nine people in New York City in 2010 with the same number of hairs on their heads.
7. Section 6.3, Exercise 6  
Find the value of each of these quantities.
  - a)  $C(5, 1)$
  - b)  $C(5, 3)$
  - c)  $C(8, 4)$
  - d)  $C(8, 8)$
  - e)  $C(8, 0)$
  - f)  $C(12, 6)$
8. Section 6.3, Exercise 16  
How many subsets with an odd number of elements does a set with 100 elements have?
9. Section 6.3, Exercise 22  
How many permutations of the letters  $ABCDEFGH$  contain
  - a) the string  $ED$ ?
  - b) the string  $CDE$ ?
  - c) the strings  $BA$  and  $FGH$ ?
  - d) the strings  $AB$ ,  $DE$ , and  $GH$ ?
  - e) the strings  $CAB$  and  $BED$ ?
  - f) the strings  $BCA$  and  $ABF$ ?
10. Section 6.3, Exercise 30  
Seven women and nine men are on the faculty in the mathematics department at a school.
  - a) How many ways are there to select a committee of five members of the department if at least one woman must be on the committee?
  - b) How many ways are there to select a committee of five members of the department if at least one woman and at least one man must be on the committee?