MATH 3503: Tashfeen's Discrete Mathematics

Homework 5

Question 1. Please read chapter 8 of Chartrand et al. and write a couple sentences about a topic/example/concept that you found difficult or interesting and why?

Question 2. Each student at a certain university is given a 6-digit code (such as 123789 or 001122).

(a) How many different codes are there?
(b) How many codes read the same forward and backward?
(c) How many codes contain only odd digits?
(d) How many codes contain at least one even digit?

Question 3. How many different 10-bit strings begin with 1011 or 0110?

Question 4. A password on a computer system consists of four characters, each of which is either a digit or a letter of the alphabet. Suppose that each password must contain at least one digit and at least one letter. How many different such passwords are there?

Question 5. A total of 70 students who go to football, basketball or hockey games on a regular basis are surveyed as to which of these three events they attend. They responded:

38 students go to football games.
38 students go to basketball games.
35 students go to hockey games.
17 students go to both football and basketball games.
15 students go to both football and hockey games.
16 students go to both basketball and hockey games.

How many go to all three?

Question 6. How many people must be present to guarantee that

(a) at least two have the same birthday?
(b) at least two of their birthdays are in the same month?
(c) at least three of their birthdays are in one of the months January, February, March, April or at least four of their birthdays are in one of the remaining months?

Question 7. How many different 8-bit strings contain exactly 5 1s?

Question 8. Show that $\binom{2n}{2} = 2\binom{n}{2} + n^2$.

Question 9. A student committee is to consist of 3 seniors and 4 juniors. A total of 6 seniors and 8 juniors have volunteered to serve on the committee. How many committees are possible?

Question 10. A total of 5 seniors, 3 juniors and 4 sophomores have volunteered to serve on a 4-person committee. How many committees are possible if

(a) there is no other restriction on membership for the committee?
(b) at least one senior, one junior and one sophomore must serve on the committee?
(c) at least 3 seniors must serve on the committee?
(d) at least one senior must serve on the committee?