CISC-102 FALL 2018

HOMEWORK 8

Please work on these problems and have them completed by next week. Assignments will **not** be collected for grading.

Readings

Read sections 5.1, 5.2, 5.3, 5.4, 5.5, and 5.6 of *Schaum's Outline of Discrete Mathematics*.
Read section 3.1, 3.2, 3.4, and 3.5 of *Discrete Mathematics Elementary and Beyond*.

Problems

(1) New parents wish to give their new baby one, two, or three different names. They have a book containing 500 names that they will choose from. How many different ways can this baby be named? Note the baby may NOT be named Alice, Alice, Alice. That is the parents may NOT use the same name more than once.
(2) How many passwords can be chosen under the condition that the password is exactly 7 symbols long using upper and lower case characters as well as digits from $0 \ldots 9$, such that at least one of the symbols is a digit.
(3) A skip straight is 5 cards that are in consecutive order, skipping every second rank (for example 3-5-7-9-J). How many 5 card hands are there (unordered selection from a standard 52 card deck) that form a skip straight?
(4) What is the number of ways to colour n identical objects with 3 colours? What is the number of ways to colour n identical objects with 3 colours so that each colour is used at least once?
(5) From 100 used cars siting on a lot, 20 are to be selected for a test designed to check safety requirements. These 20 cars will be returned to the lot, and again 20 will be selected for testing for emission standards
  (a) In how many ways can the cars be selected for safety requirement testing?
  (b) In how many ways can the cars be selected for emission standards testing?
  (c) In how many different ways can the cars be selected for both tests?
  (d) In how many ways can the cars be selected for both tests if exactly 5 cars must be tested for safety and emission?
(6) Use the binomial theorem to expand the product $(x + y)^6$.
(7) Show that

$$\binom{n}{0} - \binom{n}{1} + \binom{n}{2} - \binom{n}{3} + \cdots + \binom{n}{n} = 0$$

HINT: Use the Binomial theorem.