Math 170- Worksheet 6.3-6.4

Instructions: Answer all questions. Clearly justify your reasoning.

1   Section 6.3

Problem 1) When Baskin-Robbins was founded in 1945, it made 31 different flavors of ice cream. If you had a choice of having your ice cream in a cone, a cup, or a sundae, how many different desserts could you have?

Problem 2) Determine the number of binary strings of length 8. Do the same for ternary strings (strings over the alphabet $\Sigma = \{0, 1, 2\}$).

Problem 3) While selecting candy for students in his class, Professor Murphy must choose between gummy candy and licorice nibs. Gummy candy comes in three sizes, while packets of licorice nibs come in two sizes. If he chooses gummy candy, he must select gummy bears, gummy worms, or gummy dinos. If he chooses licorice nibs, he must choose between black and red. How many choices does he have?

Problem 4) How many seven-digit phone numbers do not begin with one of the prefixes: $1, 911, 411,$ or 555?

Problem 5) A Social-Security Number (SSN) is a sequence of 9 digits.

(a) How many SSNs are possible?

(b) How many SSNs begin with either 023 or 003?

(c) How many SSNs are possible if no two adjacent digits are permitted? [**Note:** So $235 - 93 - 2345$ is permissible, but $126 - 67 - 8189$ is not permissible as there are two consecutive 6's.]

2   Section 6.4

Problem 6) How many five-letter sequences are possible using b, o, g, e, y once each?

Problem 7) How many unordered sets are there that contain 3 objects from the set $\{1, 2, \ldots, 7\}$?

Problem 8) How many ordered sequences are there that contain 3 objects from the set $\{1, 2, \ldots, 7\}$, assuming that repeated elements are not allowed?

Problem 9) How many ways are there to pick a 7-person basketball team from 20 possible players? How many teams if the weakest player and strongest player must be on the team?

Problem 10) How many ways are there to distribute six different books among 12 children if no child gets more than one book?

Problem 11) A *three of a kind* is a 5-card poker hand with three cards of the same rank and two additional cards of two different ranks (different from both each other and the first three cards).

(a) How many three of a kind hands are there if we have three Queens?

(b) In general, how many three of a kind hands are there?

Problem 12) A *straight* is a 5-card poker hand with five cards of sequential rank (e.g., $6, 7, 8, 9, 10$), but not all of the same suit. How many straights exist? [**Hint:** Count the number of hands with five sequential cards. Then count the number of hands with five sequential cards all of the same suit. Use these two quantities to obtain your desired count.]