CISC-102 FALL 2017

HOMEWORK 9

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) 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?
(2) Let S be a finite subset of the positive integers. What is the smallest value for $|S|$ that guarantees that at least two elements $x, y \in S$ have the same remainder when divided by 100. HINT: Use the pigeon hole principle.
(3) Prove that any set of 5 natural numbers will always have two numbers n_1 and n_2 such that $4|(n_1 - n_2)$. Hint: Use the Pigeon Hole Principle.
(4) Use the binomial theorem to expand the product $(x + y)^6$.
(5) Show that

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

HINT: Use the Binomial theorem.