CISC-102 FALL 2018

HOMEWORK 7

Please work on these problems and be prepared to share your solutions with classmates in class 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 and 3.2 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?
(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) You have chosen a password that consists of 4 upper case letters from a 26 letter alphabet. How many passwords does a hacker have to try to be sure that they can break in? What if you use both upper and lower case for your four symbol password? Finally consider a password 7 symbols long and you use both upper and lower case letters, and at least one digit $(0 \ldots 9)$.
(5) How many different strings can you make using the letters TIMBITS?