CSE21 WI13

Homework #1

[Each problem is worth 10 points.]

1.1 Suppose $n > 1$. An n-digit number is a string of n digits from $\{0, 1, 2, \ldots, 9\}$ where the first digit is not 0.

(a) How many n-digit numbers (as a function of n?

(b) How many of these contain the digit 3?

(c) How many of these *don't* contain the digit 4?

1.2 In a certain computer system, a valid password consists of a string of 5, 6, or 7 symbols. The first symbol must be an uppercase letter. The remaining symbols can only be numbers or lowercase letters.
How many valid passwords are there?

1.3 A license plate consists of either:

- 3 letters followed by 4 numbers (standard plate)
- 5 letters (vanity plate)
- 2 characters, letters or numbers (big shot plate)

How many possible license plates are there?

1.4 We would like to count how many ways 3 boys and 3 girls can sit in a row.

How many ways can this be done if:

(a) there are no restrictions?

(b) all the girls sit together?

(c) every boy sits next to at least one other girl?

1.5 Lisa is thinking of a number between 1 and 1000. What is the least number of yes/no questions you could ask her and be guaranteed of learning her numbers? (Lisa always answers your questions truthfully).

1.6 How many ways are there of placing a King, a Queen, a Knight and a Bishop on a (standard) chessboard so that no two pieces are in the same row or column?