CS 228, Counting Exercises

Name:

Some questions are from **Discrete Mathematics and It's Applications 7e** by Kenneth Rosen.

- How many possible sets of initials are there, assuming that people may have either two or three names?

- How many license plates can be made using either two or three uppercase English letters followed by either two or three digits?

- The name of a variable in the Java programming language is a string of between one and 655535 characters, inclusive, where each character can be an uppercase or a lowercase letter, a dollar sign, an underscore, or a digit, except that the first character must not be a digit. Determine the number of different variable names in Java. (Hint: $\sum_{k=0}^{n} r^k = \dfrac{r^{n+1} - 1}{r - 1}$.)

- Use the principle of inclusion-exclusion to find the number of positive integers less than 1,000,000 that are not divisible by either 4 or 6. (Hint: Every fourth integer between 1 and 999,999 is divisible by four, for a total of $\lfloor 999,999/4 \rfloor = 249999$.)

- There are 38 different time periods during which classes at a university can be scheduled. If there are 677 different classes, how many different rooms will be needed?

- A company stores products in a warehouse. Storage bins in this warehouse are specified by their aisle, location in the aisle and shelf. There are 4 aisles, 10 locations in each aisle and 5 shelves per location. What is the least number of products the company can have so that at least two products must be stored in the same bin? What is the least number of products the company must have so that at least three products must be stored in the same bin?