CS 225 Assignment 5 - Part 1
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Section 9.2

11c)
The length of the bit string is 8.
- It starts with 1 and ends with 1.
- Everything in-between can be chosen in 2 ways.

$1 * 2 * 2 * 2 * 2 * 2 * 2 * 1 = 2^6$

14c)
The first four symbols are restricted to TGIF.
The last 3 symbols can be anything (a number [0-9] or a letter)
$1 * 1 * 1 * 1 * 10 * 10 * 10 = 10^3$

14e)
The first two symbols are locked to A B.
1 * 1 * 24 * 23 * 10 * 9 * 8

17a)
There are 9 ways to pick the first digit (1-9).
There are 10 ways to pick the 3 digits that come after (0-9).
9 * 10 * 10 * 10 = 9000

17b)
There are 9 ways to pick the first digit (1-9)
There are 10 ways to pick the 2 digits that come after (0-9)
There are only 5 ways to pick the last digit (1, 3, 5, 7, 9) because it needs to be odd.
9 * 10 * 10 * 5 = 4500

17c)
The first digit can be chosen in 9 ways.
The second digit can be chosen in 9 ways so long as it's distinct from the first.
The third digit can be chosen in 8 ways so its distinct from the first 2.
The fourth digit can be chosen in 7 ways so its distinct from the first 3.
9 * 9 * 8 * 7 = 4536

17d)
The first two digits can be from the place 1-8 so long as they're distinct to eachother.
The digit in the tens place is 7 because it has to be distinct.
The last digit has to be odd because we're looking for odd integers (so only 5 digits can satisfy this requirement - 1,3,5,7,9)
8 * 8 * 7 * 5 = 2240

17e)
4536 / 9000 = 0.504
2240 / 9000 = 0.2489

Section 9.3

5a)
The last digit has to be 2 because the digit is only ever either 0 or 5.
9 * 10 * 10 * 10 * 2 = 18,000

5b)
9 * 10 * 10 * 10 * 10 = 90,000.
N(Y) = 90,000
N(X) = 18,000 (from the previous solution).
Probability = 18,000 / 90,000
= 1/5

24a)
A = the set of all integers from 1 - 1000 that are multiples of 2.
B = the set of all int from 1 - 1000 that are multiple of 9.
A or B = the set of all integers from 1 - 1000 that are multiple of 2 or multiple of 9.
A and B = the set of all integers from 1 through 1000 that are multiple of 18.
N(A) = 500, N(B) = 111, N(A and B) = 55
N(A or B) = N(A) + N(B) - N(A and B)
= 500 + 111 - 55
= 611 - 55
= 556 is the number of integers that are multiple of 2 or multiple of 9 for integers 1 through 1000.

24b)
556 / 1000 = 0.556

24c)
N((A or B)^c) = N(U - A or B)
= N(U) - N(A or B)
= 1000 - 556
= 444

33e)
N (C or D) - N(H and C and D) = 3 - 2 = **1**

33f)
N(C) - N(H and C) - N(C and D) + N(H and C and D)
= 26 - 8 - 3 + 2 = 17