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CS 225; Discrete Structures in CS

Homework 7, Part 1

Set 9.2

#11c.

The first digit and last digit of a bit string can be chosen in only 1 way each, 2 ways total. So $2^{8-2} = 2^6 = 64$

#14c.

Since there's only 1 way for a license plate to start with 1 certain letter, we have 1 x 1 x 1 x 1 x 10 x 10 x 10 = $10^3 = 1000$

#14e.

There's only 1 way for a license plate to begin with A and then B, respectively, and then 24 ways for the 3rd letter and 23 ways for the 4th for the letters to be distinct. Also for the digits to be distinct, there's 10 ways for the 1st, 9 for the 2nd and 8 for the 3rd. That gives us 1 x 1 x 24 x 23 x 10 x 9 x 8 = 397,440

#17a.

To find how many integers between 1000 and 9999, we have only 9 ways for the first digit (since it can't be zero) and then 10 for the next 3 digits which gives us 9 x 10 x 10 x 10 = 9000.

b.

Similar to the above problem, we have 9000 possible integers but there are only 5 ways for any of them to be odd, which means only 5 ways for their last digit to be odd, instead of 10. That gives us 9 x 10 x 10 x 5 = 4500.

c.

For each digit to be distinct, we have 9 ways for the 1st, 9 for the 2nd (since it must be different from the 1st but can be zero), 8 for the 3rd and 7 for the 4th which gives us 9 x 9 x 8 x 7 = 4536.

d.

Since we need odd integers, the last number only has 5 ways, the 1st has 8 (can't be zero or the same as the last), the 2nd has 8 (different from first and last) and the 3rd has 7 which gives us 5 x 8 x 8 x 7 = 2240.

e.

We know we have 4536 possible distinct digit integers, therefore $\frac{4536}{9000} = .504 = 50.4\%$

For distinct digits and is odd, we get $\frac{2240}{9000} = .248 = 24.8\%$

Set 9.3

#5a.

We first find that there are 90,000 integers between 10,000 and 99,999. Then we know there are only 2 ways an integer is divisible by 5, to have a 5 or 0 at the end. Using the addition rule we get 9000 + 9000 = 18,000.

#24a.

We know there are 1000 integers from 1 to 1000.

A = integers from 1 through 1000 that are multiples of 2 = 500

B = integers from 1 through 1000 that are multiples of 9 = 111

There are 55 integers that are multiples of 18 (2 x 9)

$|A \cup B| = |A| + |B| - | A \cap B | = 500 + 111 – 55 = 556$

c.

If we know there are 556 integers that are multiples of 2 or 9, then integers that are not a multiple of 2 or 9 gives us 1000 – 556 = 444.

33e.

A = Students who checked #2 and #3 = 3

B = Students who checked #1, #2 and #3 = 2

$|A \cup B| = |A| + |B| - | A \cap B | = 3 + 2 – 2 = 3$

f.

A = Students who checked only #2 = 26

B = Students who checked any other statement except #2 = 74

$|A \cup B| = |A| + |B| - | A \cap B | = 26 + 74 – 74 = 26$.