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Assignment 7 Part 1: Set 9.2 - 11.c, 14.c, e, 17, Set 9.3 - 5, 24, 33-e, f

9.2 #11c:

How many bit strings of length 8 begin and end with a 1.

For each character, 2 possible ways, either a 0 or 1.

Total possible strings are 2^8 or 256.

Half the strings, or 2^7 begin with a 1.

Half of those also end with a 1 or 2^6 = **64**

9.2 #14c:

Total number of license plates are 26 * 26 * 26 * 26 * 10 * 10 * 10. 4 letters + 3 digits = 456, 976,000

Number of license plates that begin with TGIF would be 1* 1 * 1 * 1 * 10 * 10 * 10 = **1000 license plates.**

9.2 #14 e.

This would be 1 * 1 * 24 * 23 * 10 * 9 * 8 possible plates, which is **397,440 possible license plates.**

9.2 #17.

a. How many integers are there from 1000 to 9999?

I would say 9000 integers. 9 possible digits for the leftmost digit, because it can't be 0. The other digits can be anything from 0-9, which gives 10 possibilities for the next 3 digits, giving us

9 * 10 * 10 * 10 = **9000 integers.**

b. How many odd integers are there from 1000 through 9999.

Half of the integers would be odd, so **4500.**

c. How many integers from 1000 through 9999 have distinct digits?

9 possibilities for left most

9 for the next, reduced by 1 because of previous number

8 for the next same reasoning

7 for the last same reasoning.

9*9*8*7 = **4536 integers**

d. How many odd integers from 1000 through 9999 have distinct digits?

The number will be odd when the last digit is either 1, 3, 5, 7, or 9. 5 possibilities on last digit.

First digit has to be something from 1-9, so it would have 9 possibilities, but we have to subtract 1 because the last digit will eliminate 1 possibilitiy, so 8.

Second digit has to be something from 0-9, so 10 possibilities, but 8 effectively because we subtract 2 to account for the first and last digit.

The third digit has 7 effective possibilities, we subtract 3 from the possible 10 to account for the first, second, and last digit.

8 * 8 * 7 * 5 = **2,240** odd integers from 1000 to 9999 with distinct digits.

e. What is the probability that a randomly chosen four digit integer has distinct digits? Has distinct digits and is odd?

9000 total integers to choose out of random that are 4 digit.

C tells us 4536 are distinct, and D tells us 2240 are distinct and odd.

So for distinct, that is 4536 / 9000 = **50.4% chance** that a randomly chosen 4 digit integer will have distinct digits.

For distinct and odd, we have a **24.88% chance** that a randomly chosen 4 digit integer will both have distinct digits and be odd.

9.3 #5:

a. How many five-digit integers (integers from 10,000 through 99,999) are divisible by 5?

90,000 five digit integers for the same reason that there are 9000 4 digit integers, we are simply multiplying by 10.

If a number is divisible by 5, it either ends in a 0 or a 5, which means the last digit has 2 possibilities, the first digit has 9 possibilities, and the other 3 have 10 possibilities.

9 * 10 * 10 * 10 * 2 = **18,000 integers**

b. What is the probability that a five digit integer chosen at random is divisible by 5?

18,000 integers are divisible by 5 out of 90,000 5 digit integers, which simplifies to 1 out of 5 or **20% chance.**

9.3 #24:

a. How many integers from 1 through 1,000 are multiples of 2 or multiples of 9?

Set A = All integers 1 to 1000 multiples of 2

Set B = All integers 1 to 1000 multiples of 9

$A \cup B$ = All integers 1 to 1000 multiples of 2 or 9

$A \cap B$ = All integers 1 to 1000 multiples of both = multiples of 18

Set A = 500 integers.

Set B = 111 multiples

$A \cap B$ = 55 multiples. (18*55 = 990)

$A \cup B = A + B - (A \cap B) = 500 + 111 - 55 =$ **556 integers are multiples of 2 or multiples of 9.**

b. Suppose an integer from 1 through 1,000 is chosen at random. Use the result of part a. to find the possibility that the integer is a multiple of 2 or a multiple of 9.

556 out of 1000 possibilities is **55.6%**

C. How many integers from 1 through 1,000 are neither multiples of 2 nor multiples of 9?

1000 – 556 = **444 integers** that are neither multiples of 2 or multiples of 9.

9.3 #33

e. 28 check #1, 26 checked #2, 14 checked #3, 8 checked #1 and #2, 4 checked #1 and #3, 3 checked #2 and #3, 2 checked all three statements.

We are looking for who checked #2 and #3 but not #1.

3 checked #2 and #3, while 2 checked all three statements. These 2 out of 3 do not qualify for not checking #1. Therefore, **only 1** out of the 3 students who checked #2 and #3 did not check #1.

F. How many students checked #2 but neither of the other two?

26 people checked 2. 8 checked 1 and 2, so we can’t count those. 3 people checked 2 and 3, so we can’t count those. 2 people checked all, but those are included in the other categories as a subset, so we don’t subtract those.

26 – 8 – 3 = **15 people**