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Assignment 5 – Due 7/30/2017

Part I. Exercise Set 9.2 [11c, 14c, e, 17] Set 9.3 [5,24, 33e, f]

Set 9.2 [11c, 14c, e, 17]

11c Q: How many bit strings of length 8 begin and end with a 1?

A:

$2^6 = 64$

14c Q: Suppose that in a certain state, all automobile license plates have four letters followed by three digits.

c. How many license plates could begin with TGIF?

A:

$10^3 = 1000$

e. How many license plates could begin with AB and have all letters and digits distinct?

A:

For all letters and digits distinct: 24 x 23 x 10 x 9 x 8 = 397,440

17Q:

a) **How many integers are there from 1000 through 9999?**
b) **How many odd integers are there from 1000 through 9999?**
c) **How many integers from 1000 through 9999 have distinct digits?**
d) **How many odd integers from 1000 through 9999 have distinct digits?**
e) **What is the probability that a randomly chosen four-digit integer has distinct digits? Has distinct digits and is odd?**

A:

a) **m = 1000, n = 9999; n-m+1 = (9999-1000)+1) = 9000 total integers**
b) **9000/2 = 4500 odd integers (or 4500 even integers).**
c) **9 x 9 x 8 x 7 = 4536 integers with distinct digits.**
d) **8 x 8 x 7 x 5 = 2240**

e) **Four-digit integer with distinct digits: 4536/9000 = 0.504 or 50.4%**
Four-digit integer with distinct digits and is odd: 2240/9000 = 0.2489 or 24.89%

Set 9.3 [5, 24, 33e, f]

5Q:

a) **How many five-digit integers (integers from 10000 through 99999) are divisible by 5?**
b) **What is the probability that a five-digit integer chosen at random is divisible by 5?**

A:

a) **Let A_1 be the set of five-digit integers that end with a 5 and A_2 be the set that end with a 0 (to show divisibility by 5).**
A_1 = 9 x 10 x 10 x10 = 9000; A_2 = 9 x 10 x 10 x10 = 9000
Answer is $A_1 + A_2$ = 18000

b) **Total number of five-digit integers is: 9 x 10 x 10 x 10 x 10 = 90000**
Probability of a five-digit integer divisible by 5 is: 18000/90000 = 0.2 or 20%

24Q:

a) **How many integers from 1 through 1000 are multiples of 2 or multiples of 9?**
b) **Suppose the integer from 1 through 1000 is chosen at random. Use the result from part a to find the probability that the integer is a multiple of 2 or multiple of 9.**
c) **How many integers from 1 through 1000 are neither multiples of 2 nor multiples of 9?**

A:

a) **Let A = the set of all integers from 1 through 1000 that are multiples of 2**
Let B = the set of all integers from 1 through 1000 that are multiples of 9

A U B = the set of all integers from 1 through 1000 that are multiples of 2 or multiples of 9
A ∩ B = the set of all integers from 1 through 1000 that are multiples of both 2 and 9, or 18.

Need to find N (A U B) = N(A) + N(B) - N (A ∩ B)

N(A) = 2k = 500
N(B) = 9k = 111
N (A ∩ B) = 18k = 55

N(A) + N(B) - N (A ∩ B)
= (500 + 111) – 55
= 556

b) Total integers from 1 through 1000 = 1000
Probability that the integer is a multiple of 2 or multiple of 9
556 / 1000
= 0.556 or 55.6%

c) 1000 – 556 = 444

33 Q: A college conducted a survey to explore the academic interests and achievements of its students. It asked students to place checks beside the numbers of all the statements that were true of them. Statement #1 was "I was on the honor roll last term," statement #2 was "I belong to an academic club, such as the math club or the Spanish club," and statement #3 was "I am majoring in at least two subjects." Out of a sample of 100 students, 28 checked #1, 26 checked #2, and 14 checked #3, 8 checked both #1 and #2, 4 checked both #1 and #3, 3 checked both #2 and #3, and 2 checked all three statements.

33Q: How many students checked #2 and #3 but not #1?

Let A = Students who chose #1
Let B = Students who chose #2
Let C = Students who chose #3
Let A ∩ B = Students who chose #1 and #2
Let A ∩ C = Students who chose #1 and #3
Let B ∩ C = Students who chose #2 and #3
Let A ∩ B ∩ C = Students who chose #1, 2, and 3

e. How many students checked #2 and #3 but not #1?

A: (B ∩ C) – (A ∩ B ∩ C) = 3 – 2 = 1

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

A: B – (A ∩ B) – (B ∩ C) + (A ∩ B ∩ C) = 26 - 8 – 3 + 2 = 17