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**Section: A**

### **Homework 1.1**

**Jerry and Susan have a joint bank account. Jerry goes to the bank 20% of the days. Susan goes there 30% of the days. Together they are at the bank 8% of the days.**

- a. Susan was at the bank last Monday. What's the probability that Jerry was there too?**
- b. Last Friday, Susan wasn't at the bank. What's the probability that Jerry was there?**
- c. Last Wednesday at least one of them was at the bank. What is the probability that both of them were there?**

**Solution:**

$$P(\text{Jerry}) = 20\%$$

$$P(\text{Susan}) = 30\%$$

$$P(\text{Jerry} \cap \text{Susan}) = 8\%$$

$$\text{Hence } P(\text{Jerry} \cup \text{Susan}) = 42\%$$

- a)  $P(\text{Jerry} \cap \text{Susan}) / P(\text{Susan}) = 8/30 = 0.266 * 100 = 26.66 \%$
- b)  $(P(\text{Jerry}) - P(\text{Jerry} \cap \text{Susan})) / (100 - P(\text{Susan})) = (20 - 8)/70 = 0.1714 * 100 = 17.14 \%$
- c)  $P(\text{Jerry} \cap \text{Susan}) / P(\text{Jerry} \cup \text{Susan}) = 8/42 = 0.1905 * 100 = 19.05 \%$

**1.2 Harold and Sharon are studying for a test. Harold's chances of getting a "B" are 80%. Sharon's chances of getting a "B" are 90%. The probability of at least one of them getting a "B" is 91%.**

- a. What is the probability that only Harold gets a "B"?**
- b. What is the probability that only Sharon gets a "B"?**
- c. What is the probability that both won't get a "B"?**

**Solution:**

$$P(\text{Harold}) = 80 \%$$

$$P(\text{Sharon}) = 90 \%$$

$$P(\text{Harold} \cup \text{Sharon}) = 91 \%$$

$$\text{Hence } P(\text{Harold} \cap \text{Sharon}) = 79 \%$$

- a)  $P(\text{Harold}) - P(\text{Harold} \cap \text{Sharon}) = 80 - 79 = 1 \%$
- b)  $P(\text{Sharon}) - P(\text{Harold} \cap \text{Sharon}) = 90 - 79 = 11 \%$
- c)  $100 - P(\text{Harold} \cup \text{Sharon}) = 100 - 91 = 9 \%$

### 1.3 Homework

Jerry and Susan have a joint bank account. Jerry goes to the bank 20% of the days. Susan goes there 30% of the days. Together they are at the bank 8% of the days. Are the events "Jerry is at the bank" and "Susan is at the bank" independent?

**Solution:**

$$P(\text{Jerry} / \text{Jerry} \cup \text{Susan}) = 20/42$$

$$P(\text{Susan} / \text{Jerry} \cup \text{Susan}) = 30/42$$

Therefore, both the events are dependent.

### 1.4 Homework

You roll 2 dice.

a. Are the events "the sum is 6" and "the second die shows 5" independent?

b. Are the events "the sum is 7" and "the first die shows 5" independent?

**Solution:**

Total possible outcome for 2 dice to roll is  $= 6 \times 6 = 36$

a)  $P(A)$  is the probability of getting sum of 6  $= 5/36$ , Sample Space = (1+5, 2+4, 3+3, 4+2, 5+1)

If second die shows 5 then the first die must show 1 to get 6 as sum hence the probability becomes  $1/5$ .

Therefore, these events are dependent.

b)  $P(A)$  is the probability of getting sum of 7  $= 6/36$ , Sample Space = (1+6, 2+5, 3+4, 4+3, 5+2, 6+1)

If first die shows 5 then the first die must show 2 to get 7 as sum hence the probability becomes  $1/6$ .

Therefore, these events are independent.

### Homework 1.5

An oil company is considering drilling in either TX, AK and NJ. The company may operate in only one state. There is 60% chance the company will choose TX and 10% chance –NJ. There is 30% chance of finding oil in TX, 20% -in AK, and 10% -in NJ. 1. What's the probability of finding oil? 2. The company decided to drill and found oil. What is the probability that they drilled in TX?

**Solution:**

$$1. P(\text{Finding Oil}) = (0.6 \times 0.3) + (0.1 \times 0.1) + (0.3 \times 0.2) = 0.25 \times 100 = 25 \%$$

$$2. P(\text{Drilled TX}) = (0.6 \times 0.30) / P(\text{Finding Oil}) = 0.72 \times 100 = 72 \%$$

## Homework 1.6

The following slide shows the survival status of individual passengers on the Titanic. Use this information to answer the following questions

- What is the probability that a passenger did not survive?
- What is the probability that a passenger was staying in the first class?
- Given that a passenger survived, what is the probability that the passenger was staying in the first class?
- Are survival and staying in the first class independent?
- Given that a passenger survived, what is the probability that the passenger was staying in the first class and the passenger was a child?
- Given that a passenger survived, what is the probability that the passenger was an adult?
- Given that a passenger survived, are age and staying in the first class independent?

### Solution:

a) Probability that passenger did not survive =

No. of passenger that did not survive / Total passenger =  $1490/2201 = 0.6769 \times 100 = 67.69\%$

b) Probability that passenger was staying in first class =

Total passenger in first class / Total passenger in boat =  $325/2201 = 0.1476 \times 100 = 14.76\%$

c) Probability that passenger survived and was in first class =  $203/711 = 0.2855 \times 100 = 28.55\%$

d) Probability of survival and staying in first class is dependent.

e) Probability of passengers who survived, staying in first class and child is =  $6/711 = 0.0084 \times 100 = 0.84\%$

f) Probability that a passenger survived and is an adult is =  $654/711 = 0.919 \times 100 = 91.9\%$

g) Probability of survival, age and staying in first class is dependent.