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Course : Computer Science

First Name : Nidhi

Last Name : Chovatiya

CWID : 10457344

classmate
Date ___
Page CKID

Nidhi Chovatiya - 10457344

Probability Assignment

⇒ Homework 1.1

	Jerry		
	Go to bank	Not go to bank	
Susan	0.08	0.22	0.30
	0.12	0.58	0.70
	0.20	0.80	1.00

P(Jerry ∩ Susan) = 8%

a) $P(\text{Jerry} \mid \text{Susan}) = \dfrac{P(\text{Jerry} \cap \text{Susan})}{P(\text{Susan})}$

$= 8/30$

$= \boxed{26.66\%}$

b) $P(\text{Jerry} \mid \text{Susan}') = \dfrac{P(\text{Jerry} \cap \text{Susan}')}{P(\text{Susan})}$

$= \overset{6}{\cancel{12}} / \underset{35}{\cancel{70}} = \boxed{0.1714\%}$

c) $P(\text{Jerry} \cap \text{Susan} \mid \text{Jerry} \cup \text{Susan})$

$$= \frac{P[P(\text{Jerry} \cap \text{Susan}) \cap (\text{Jerry} \cup \text{Susan})]}{P(\text{Jerry} \cup \text{Susan})}$$

$$= \frac{P(\text{Jerry} \cap \text{Susan})}{P(\text{Jerry} \cup \text{Susan})}$$

$$= \cancel{8}^{4}/\cancel{42}_{21}$$

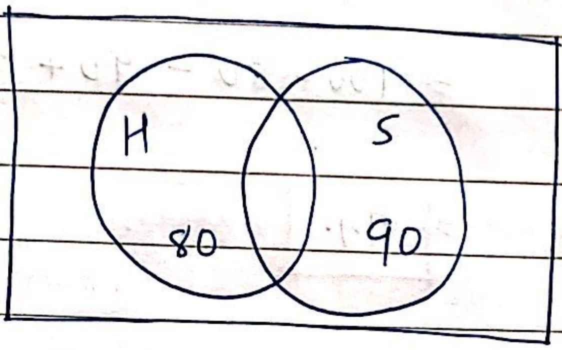
$$= \boxed{19.04\%}$$

$P(\text{Jerry} \cup \text{Susan}) = P(J) + P(S) - P(J \cap S)$

$= 20 + 30 - 8$

$= \boxed{42}$

⇒ Homework 1.2



here
Harold = H
Sharon = S

$P(H \cup S) = 91\%$

$P(H \cap S) = P(H) + P(S) - P(H \cup S)$

$= 80 + 90 - 91$

$= 79\%$

a) $P(H - S) \Rightarrow P(H) - P(H \cap S)$

$\Rightarrow 80 - 79$

$\Rightarrow \boxed{1\%}$

b) $P(S - H) = P(S) - P(H \cap S)$

$= 90 - 79$

$= \boxed{11\%}$

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c) $P(H' \cup S') = 100 - [P(H) + P(S) - P(H \cap S)]$

$= 100 - 80 - 90 + 79$

$= \boxed{9\%}$

⇒ Homework 1.3

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

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

$= 20\% \times 30\%$

$= \boxed{6\%}$

These events are independent, since both are not same.

⇒ Homework 1.4

Sum	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

a) $P(\text{sum is } 6) = 5/36$

$P(\text{second die shows } 5) = \cancel{6}^{1}/\cancel{36}_{6}$

$= \boxed{1/6}$

$P(\text{sum is } 6 \cap \text{second die shows } 5)$

$= P(\text{sum is } 6) \times P(\text{second die show } 5)$

$= 5/36 \times 1/6 = \boxed{5/216}$

$\therefore$ P(sum is 6 $\cap$ second die shows 5) = $1/36$

$\because$ Both are not equal, so events are $\boxed{\text{dependent.}}$

b) P(sum is 7) = $\cancel{6}^{1}/\cancel{36}_{6}$ = $1/6$

P(first die shows 5) = $6/36$ = $1/6$

P(sum is 7 $\cap$ first die shows 5)

= P(sum is 7) $\times$ P(first die shows 5)

= $1/6 \times 1/6$

= $1/36$

$\therefore$ Both events are not equal

So, these events are $\boxed{\text{dependent.}}$

⇒ Homework 1.5

	Tx	AK	NJ	
Oil	18	6	1	25
No Oil	42	24	9	75
	60	30	10	100

$$P(\text{Oil} \mid Tx) = \frac{P(\text{Oil} \cap Tx)}{P(Tx)}$$

$$P(\text{Oil} \cap Tx) = P(\text{Oil} \mid Tx) \times P(Tx)$$
$$= 30 \times 60$$
$$= 18\%$$

$$P(\text{Oil} \cap NJ) = P(\text{oil} \mid NJ) \times P(NJ)$$
$$= 10 \times 10$$
$$= 1\%$$

$$P(\text{Oil} \cap AK) = P(\text{Oil} \mid AK) \times P(AK)$$
$$= 20 \times 30$$
$$= 600/100 = 6\%$$

a) $P(\text{oil}) = \boxed{25\%}$

b) $P(Tx \mid \text{Oil}) = \dfrac{P(Tx \cap \text{Oil})}{P(\text{Oil})}$

$= 18/25$

$= \boxed{72\%}$

⇒ Homework 1.6

a) P(passenger did not survive)

$$= \frac{1490}{2201} = \boxed{0.677}$$

b) P(Passenger in the first class)

$$= \frac{325}{2201} = \boxed{0.147}$$

c) P(Passenger in the first class | Passenger survived)

$$= \frac{203}{711}$$

$$= \boxed{0.2855}$$

d) $\because$ P (first class | S) $\neq$ P(first class)

(c) $\neq$ (b)

Hence, These are $\boxed{\text{dependent.}}$

e) P(Passenger in first class and passenger was child / passenger survived)

$$= \frac{6}{711} = \boxed{0.8438}$$

f) P(passenger is adult) / P(passenger survived)

$$= \frac{654}{711} = \boxed{91.98\%}$$

g) $P(A \cap \text{first class} | S) = \frac{197}{711}$

$P(A) | P(S) = \frac{654}{711}$

$P(\text{first class}/S) = \frac{203}{711}$

$P(A \cap \text{first class} | S) \neq P(A|S) \times P(FC|S)$

$$\frac{197}{711} \neq \frac{654}{711} \times \frac{203}{711}$$

$0.277 \neq 0.2626 \Rightarrow$ Dependent

$\Rightarrow$ Given that passenger survived, Adult & first class are dependent on each other.

$$P(\text{child} \cap \text{first class} / S) = \frac{6}{711}$$

$$P(\text{child}/S) = \frac{57}{711}, \quad P(FC) \mid P(S) = \frac{203}{711}$$

$$\frac{P(\text{Child} \cap \text{first class})}{S} \neq P(\text{child}) \mid P(S) \times P(FC)/P(S)$$

$$\frac{6}{711} \neq \frac{57}{711} \times \frac{203}{711}$$

$$0.0084 \neq 0.0228 \Rightarrow \text{Dependent}$$

Hence, events are $\boxed{\text{dependent.}}$