16	15 Jan	$1149
17	16	1109
	17	1083

15	16	
16	16	948 del.
		923

CS - 513 -
HW 1.1

Given - Jerry goes bank 20% $P(J) = 0.2$.
Jerry does not go to the bank 80% $P(J') = 0.8$.
Susan goes bank 30%. $P(S) = 0.3$.
Susan does not go to the bank = 70% $P(S') = 0.7$

Both together at the bank $P(J \cap S) = 0.08$ 8%.

A] $\frac{P(J \cap S)}{P(S)} = P(J|S) \rightarrow$ Prob. of J given Prob of S has occured
$= \frac{0.08}{0.3} = 0.2667 = \underline{26.67\%}$.

B] $P(J/S') = \frac{P(J \cap S')}{P(S')} = \frac{P(J) - P(J \cap S)}{1 - P(S)} \Rightarrow$ formula

$= \frac{0.2 - 0.08}{1 - 0.3} = \frac{0.12}{0.7} = 0.1714 = \underline{\underline{17.14\%}}$.

C] $\frac{P(J \cap S)}{(J \cup S)} \rightarrow$ Atleast 1 is present, what is prob of both being there.

$\frac{P(J \cap S) \cup P(P \cup S)}{P(J \cup S)} = \frac{P(J \cap S)}{P(J \cup S)} = \frac{0.08}{P(J) + P(S) - P(J \cap S)}$

$= \frac{0.08}{0.42} = 0.19048 = 19.048\%$.

HW 1.2.-

Given - Harolds getting B = P(H) = 0.8.

Sharon getting B = P(S) = 0.9

Atleast 1 of them getting B = P(H∪S) = 0.91

a. Only Harold gets B

P(H) only = P(H∪S) − P(S)

= 0.91 − 0.90 = 0.01 = 1%.

b. Only Sharon gets B.

P(S) only = P(H∪S) − P(~~B~~ H)

= 0.91 − 0.8

P(S) only = P(S) − P(H∩S) = 0.91 − 0.8 = 0.11 = 11%.

= P(S) − [P(H) + P(S) − P(H∪S)]

= 0.9 − [0.8 + 0.9 − 0.91]

= 0.9 − [1.7 − 0.91]

= 0.9 − 1.7 + 0.91 = 0.11 = 11%.

c. Both won't get. P(sample) − P(H∪S)

= 100% − 91% = 9%

HW 1.3 - Given - Jerry goes to bank = 20% = P(J) = 0.2

Susan goes to bank = 30% = P(S) = 0.3

Prob they're together at bank = P(J∩S) = 0.08

Test of ~~in~~ independency states.

P(J∩S) = P(J) × P(S)

= 0.2 × 0.3 = 0.06 ≠ 0.08 ≠ P(J∩S)

∴ The events are not independent. They are dependent.

HW 1.4 –

a) is "Sum = 6" & "Second die = 5" independent?

"Sum = 6" $\Rightarrow P(S=6) = \frac{5}{36} \Rightarrow P(X)$

"2nd die = 5" $\Rightarrow P(x, 5) = \frac{6}{36} \rightarrow P(Y)$

Independency test.

$P(X \cap Y) = \frac{1}{36}$

$P(X) * P(Y) = \frac{5}{36} \times \frac{6}{36} \neq \frac{1}{36} \Rightarrow$ They are not independent

They are dependent events.

b) $P(\text{"Sum = 7"}) = P(7) = \frac{6}{36} = \frac{1}{6}$

$P(1^{st} \text{ die} = 5) = P(5) = \frac{6}{36} = \frac{1}{6}$

$P(7 \cap 5) = \frac{1}{36}$

$P(7) * P(5) = \frac{1}{6} \times \frac{1}{6} = \frac{1}{36} = P(7 \cap 5)$

$\therefore$ They are independent events.

HW 1.5 –

Given – Chance of TX = P(TX) = 0.6.
Chance of NJ = P(NJ) = 0.1
Chance of AK = P(AK) = 100 − 70 = 0.3.

Change of oil P(oil in TX) = 0.3
P(oil in NJ) = 0.1
P(oil in AK) = 0.2.

1. Prob. of finding oil. =
$= 0.6 \times 0.3 + 0.1 \times 0.1 + 0.3 \times 0.2$
$= 0.18 + 0.01 + 0.06 = 0.25. = \underline{25\%}.$

2. Prob. of drilling & finding oil in TX.
$= \dfrac{P(TX) \times P(\text{oil in TX})}{P(\text{finding oil})} = \dfrac{0.6 \times 0.3}{0.25} = 0.72 = 72\%$

HW 1.6 — 1. Prob. that a passenger did not survive –
* considering crew as passenger = 2201 − 885 = 1316.

case 1: Passengers who died = 1490 − 673 = 817.
$P = \dfrac{817}{1316} = 0.6208 = \underline{62.08\%}.$

* considering crew as passenger = 2201.

case 2 – passengers who died = 1490.
$P = \dfrac{1490}{2201} = 0.6770 = \underline{67.70\%}.$

2. Passengers in first class

case 1 Passengers in F.C = 325.
$P(\text{Passenger in First Class}) = \dfrac{325}{1316} = 0.2470 = \underline{24.70\%}.$

case 2 Passengers in F.C. = 325.
$P(\text{Passenger in F.C}) = \dfrac{325}{2201} = \underline{14.77\%}.$

3. Total number of passenger survived in F.C = 203.

Case 1 Total No. of passengers survived = 499

Prob. of passenger in F.C & survived $= \frac{203}{499} = 40.68\%$.

Case 2 Total No. of passenger survived = 711

Prob of passenger in FC & survived $= \frac{203}{711} = 28.55\%$.

4. Prob. of survival = $(711/2201) = 32.3\% = P(S)$

Prob of staying in F.C $- (325/2201) = 14.77\% = P(F)$

Prob of survival & in F.C = $P(S \cap F) = (203/325) = 62.46\%$

Independency test -

$P(S \cap F) \neq P(S) * P(F)$ as $0.32 \times 0.14 \neq 0.62$

$\therefore$ They are dependent events.

5. Total passengers who survived = 499.

Case 1 child in FC = 6.

P(child and passenger who survived) $= \frac{6}{499} = 1.202\%$.

Case 2 Total passengers who survived = 711

$\therefore \frac{6}{711} =$ ~~84.38%~~ 0.84%.

6. Adult survived passenger = 442.

Case 1 Total " " = 499.

P(Adult & survived) $= \frac{442}{499} = 88.577\%$.

Case 2 Total survived pass. = 711; Adult surv. pass = 654.

P(Adult & survived) $= \frac{\cancel{442}\ 654}{711}$

$= 91.98\%$.

7. P(Age & survived) = P(Adult & Sur) + P(child & Sur)

$= 499/499 = 100\%$.

Case 1

P(first class & survived) $= \frac{203}{499} = 40.681\%$.

→ Math behind reinforcement.
→ legal actions.
↳ stochastic - random prob.
raw pixel values.

Test of Independence

P(FC | Surv ∩ Age | survived) = P(Age | surv) * P(FC | sur)

0.40681 = 1 × 0.40681

∴ Independent events.

Case 2 –

P(Age | sur) × P(1st class | sur) ≠ P(A | sur ∩ FC | sur)

∴ dependent events.

HW 1.7

Test of Independency $P(A \cap B) = P(A) * P(B)$

$P(A \cap B / C) = P(A/C) * P(B/C)$

Calculations shown for the first One –

A = Person is adult. = P(adult / surv) * P(FC / survived)

B = Person in FC. $= * \frac{1438}{1490} \times \frac{122}{1490}$

C = Person survived

$P(A \cap B / C) = 0.97 \times 0.08$

$P(A \cap B) / 1490 = 0.97 \times 0.08$.

$P(A \cap B) = 0.97 \times 0.08 \times 1490 = 118.34$

≈ 118.

Similarly

Total.

		1	2	3	Crew	Total.
Age	Adult	309	271	671	841	2092
	Child	16	14	35	44	109
	Total	325	285	706	885	2201

Not survived

	1	2	3	Crew	Total.
Adult	187	108	164	195	654
Child	16	10	14	17	57
Total	203	118	178	212	711

Survived.

	1	2	3	Crew	Total.
Adult	118	161	510	609	1438
Child	4	6	18	24	52
Total	122	167	528	673	1490