Homework 1.1

	Susan going	Susan not going	
jerry going	.8	.12	.20
jerry not going	.22	.58	.80
	.30	.70	.100

a) Probability that jerry too was at the bank?

$= P(\text{Jerry going} \mid \text{Susan going})$

$= \frac{8}{30}$

$\Rightarrow 0.267$ or $\boxed{26.7\%}$

b) Susan wasn't at the bank, probability of Jerry being at bank.

P(Jerry going | Susan not going)

$= \frac{12}{70}$.

$\Rightarrow$ 0.17124 or $\boxed{17.12\%}$

c) Probability that both of them were at bank $= \frac{0.08}{1-0.58}$

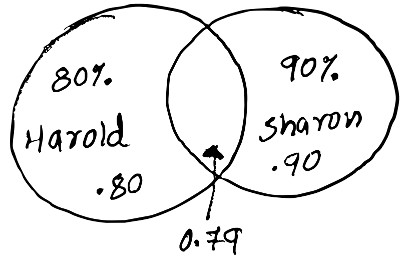
$= \frac{0.08}{0.42}$

$= 0.19047..$

or

$\boxed{19.05\%}$

Homework 1.2



P (Harold gets B $\cup$ Sharon gets B) =
P(harold get B) + P(Sharon gets B) −
P(harold gets B $\cap$ sharon gets B)

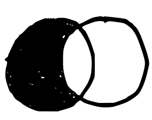
P(Harold $\cap$ Sharon) = P(Harold) +
P(sharon) − P(Harold $\cup$ Sharon)

$= 0.80 + 0.90 - 0.91$

$= 1.7 - 0.91$

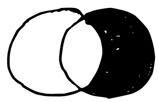
$= 0.79$

a) Probability that Harold gets B.



$P(H) = 0.80 - 0.79 = 0.01$ or $\boxed{1\%}$

b) Probability that sharon get B.



$0.90 - 0.79 = 0.11$ or $\boxed{11\%}$

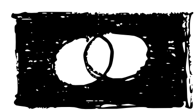
c) Probability that wont get.

$= 1 - P(\text{both will get})$

$= 1 - P(\text{Harold} \cap \text{Susan})$

$= 1 - 0.91$

$= 0.09$



or

$\boxed{9\%}$

Homework 1.3

P(Jerry goes to bank) = 20%

& 0.2

P(Susan goes to bank) = 30%

& 0.3

P(both are at bank) = 8%

& $\underline{\underline{0.08}}$

P(Jerry at bank) * P(Susan at bank)

$= 0.2 \times 0.3 = \underline{\underline{0.06}}$

Since P(Jerry at bank $\cap$ Susan at bank)

$\neq$ P(Jerry at bank) * P(Susan at bank)

the two events are <u>NOT INDEPENDENT</u>

$\boxed{\text{NO}}$

Homework 1.4

	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) $P(\text{Sum is } 6) = \frac{5}{36}$

$P(2^{nd} \text{ dice is } 5) = \frac{5}{36}$

$P(\text{Sum is } 6 \cap 2^{nd} \text{ dice is } 5)$

$= P(2^{nd} \text{ dice is } 5 \mid \text{Sum is } 6) \cdot P(\text{Sum is } 6)$

$= \frac{1}{5} \times \frac{5}{36} = \frac{1}{36}$

$$P(\text{sum is }6)\,P(\text{dice is }5) = \frac{5}{36} \times \frac{5}{36}.$$

Since, $\frac{5}{36} \times \frac{5}{36} \neq \frac{1}{36}.$

ie, $P(\text{sum is }6 \cap \text{dice is }5) \neq$

$P(\text{sum is }6) * P(\text{dice is }5)$

the given events are

<u>NOT INDEPENDENT</u>

b) $P(\text{sum is }7) = \frac{6}{36} = \frac{1}{6}.$

$P(\text{dice is }5) = \frac{6}{36} = \frac{1}{6}.$

$P(\text{sum is }7 \cap \text{dice is }5) = P(\text{dice is }5 \mid \text{sum is }7)$

$* \; P(\text{sum is }7)$

$= \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$

$$P(\text{sum is } 7) \times P(\text{dice is } 5) = \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}.$$

Since $P(\text{sum is } 7 \cap \text{dice is } 5) =$

$$P(\text{sum is } 7) \times P(\text{dice is } 5)$$

the two events are <u>INDEPENDENT</u>

Homework 1.5

	TX	AK	NJ	
Finding oil	18%	6%	1%	25%
Not finding	42%	24%	9%	75%
	60%	30%	10%	100

	Drilling	Finding oil
TK	60	30
AK	30	20
NJ	10	10

1]. P(Finding oil)

$= 0.18 + 0.06 + 0.01 = 0.25$ or $\underline{\underline{25\%}}$

2] P(drilled in Texas | Found oil)

$= \dfrac{0.18}{0.25} = 0.72$ or $\underline{\underline{72\%}}$

Homework 1.6

* Considering crew members <u>NOT</u> as passengers.

a) P(Passenger did NOT survive)

$$= \frac{1490-673}{2201-885} = \frac{817}{1316} = 0.6208 \text{ \& } 62.08\%$$

b) P(Passenger was in 1st class)

$$= \frac{325}{2201-885} = \frac{325}{1316} = 0.2469 \text{ \& } 24.69\%$$

c) P(Passenger was in 1st class | Passenger survived)

$$= \frac{203}{711-212} = 0.4068 = 40.68\%$$

d) P(Passenger survived)

$$= \frac{711-212}{1316} = \frac{499}{1316} = 0.3792 \text{ \& } 37.92\%$$

P(Passengers in 1st cabin)

$$= \frac{325}{1316} = 0.2469 \text{ \& } 24.69\%$$

P(Passengers in 1st cabin | Passenger Survived) *
P(Passenger survived) —— (1)

$$= \frac{203}{499} \times \left[1 - \frac{817}{1316}\right]$$

$$= 0.4068 \times (1 - 0.6208)$$

$$= 0.4068 \times 0.3792$$

$$= 0.1543 \quad \text{\& } 15.43\%$$

P(Passengers survived) * P(Passengers in 1st class) —— (2)

$$= 0.3792 * 0.2469$$

$$= 0.0936 \quad \text{\& } 9.36\%$$

$$* \; 15.43\% \neq 9.36$$

Since,

$P(\text{Passengers survived} \cap \text{Passengers in } 1^{st} \text{ class})$
$\neq P(\text{survived}) * P(\text{Passenger in } 1^{st} \text{ class})$

The two events are NOT INDEPENDENT

e) $P(\text{Passenger was a child \& in } 1^{st} \text{ class} \mid \text{Passenger survived})$

$$= \frac{6}{499} = 0.01202 \text{ or } 1.2\%$$

f) $P(\text{Passenger was an adult} \mid \text{Passenger survived})$

$$= \frac{654-212}{711-212} = \frac{442}{449}$$

$= 0.8858$

or 88.58%

g) Let, A = Age of passengers who survived

& B = Passengers in 1^{st} class who survived

$$P(A \cap B) = P(A|B) \cdot P(B)$$

= (Adult + child | survived) ×

P(Passengers in 1^{st} class | survived)

$$= \left[\frac{442}{499} + \frac{57}{499}\right] \times \frac{203}{499}$$

= 0.4068 or 40.68%

$$P(A) * P(B)$$

$$= \frac{442}{499} + \frac{57}{499} \times \frac{203}{499}.$$

= 0.4068 or 40.68%

Since

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

Events are <u>INDEPENDENT</u>

Considering Crew members are <u>also</u> passengers of Titanic,

a] Probability that passengers did not survive.

$$= \frac{1490}{2201} = 0.6769 \text{ or } 67.69\%$$

b] Probability that a passenger was staying in the 1^{st} class.

$$= \frac{325}{2201} = 0.1477 \text{ or } 14.77\%$$

c] probability that the passenger was staying in 1^{st} class, given the passenger survived.

$$= \frac{203}{711} = 0.2855 \text{ or } 28.55\%$$

d] are survival & staying in 1^{st} class independent?

$$P(\text{Passenger survived}) = \frac{711}{2201} = 0.323 \text{ or } 32.3\%$$

$P(\text{passenger in } 1^{st} \text{ class}) = \dfrac{325}{2201} = 0.1477$ or 14.77%

$p(\text{passengers in } 1^{st} \text{ cabin} \mid \text{passenger survived}) * p(\text{passenger survived})$

$$= \frac{203}{711} \times \left[1 - \frac{711}{2201}\right]$$

$$= 0.2855 \times 0.323.$$

$$= 0.0922$$

or 9.22%

$p(\text{passengers survived}) * P(\text{passengers in } 1^{st} \text{ class})$

$$= 0.323 \times 0.1477$$

$$= 0.0477$$

or

4.77%

$$9.22 \neq 4.77$$

Since, $P(\text{passengers survived} \cap \text{passengers in } 1^{st} \text{ class}) \neq P(\text{survived}) * P(\text{passengers in } 1^{st} \text{ class})$

the two events are NOT INDEPENDENT

e) P(Passenger was a child and in 1^{st} class | passenger survived)

$$= \frac{6}{711} = 0.0084$$

or

0.8%

f) P(passenger was an adult | passenger survived)

$$= \frac{654}{711} = 0.9198$$

or

91.98 %

g) are the age and staying in the 1^{st} class independent given the passenger survived.

Let A = Age of the passenger who survived
& B = Passenger in the 1^{st} cabin who survived.

$$P(A \cap B) = P(A|B) \cdot P(B)$$

= P(Adult + child | survived) *
P(Passenger in 1^{st} class)

$$= \left[\frac{654}{711} + \frac{57}{711}\right] \times \frac{203}{711}$$

$$= [0.9198 + 0.8017] \times 0.2855$$

$$= 0.4915$$

or

49.15%

$P(A) \times P(B).$

$$= \frac{654}{711} + \frac{57}{711} \times \frac{203}{711}$$

$$= 49.15\%$$

Since,

$$P(A \cap B) = P(A) \times P(A)$$

the two events are <u>INDEPENDENT</u>