Homework 1.1

$P(J) = 0.2 \quad P(S) = 0.3$

$P(J \cap S) = 0.08$

a. $P(J|S) = \frac{P(J \cap S)}{P(S)} = \frac{0.08}{0.3}$

$= 0.26 = 26\%$

b. $P(J|1-S) = \frac{P(J)}{1-P(S)} = \frac{0.12}{1-0.3}$

$= \frac{0.12}{0.7} = 0.17.$

c. $P(J \cup S$ / atleast one of them)

$= \frac{0.08}{0.42} = 0.190$

Homework 1.2

P(Sharon getting B) = 0.9 = P(S)

P(Harold getting B) = 0.8 = P(H)

P(Atleast one of them get B) = 0.9

$= P(H \cup S)$

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

$= 80 + 90 - 91$

$= 79\%$

a. P(Harold gets a B) $= 80 - 79$

$= 1\%$

b P(Sharon gets a B) $= 90 - 79$

$= 11\%$

c. P(None get a B) $=$

$100 -$ (All get a B)

$= 100 - (1 + 11 + 79)$

$= 100 - 91 = 9\%$

Homework 1.3

$P(J) = 0.2$

$P(S) = 0.3$

$P(J \cap S) = 0.08.$

$P(J \cap S) = P(J) * P(S)$

0.08

0.2×0.3

$= 0.06.$

Since $0.08 \neq 0.06$

They are not independent

Homework 1.4

Possible outcomes when you roll two dice = 36

Probability of get sum of 6

$= \frac{5}{36} = P(A)$

Probability of second die showing 5 = 1/6

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

$\frac{1}{36} \neq \frac{5}{36} \times \frac{1}{6}$

They are not independent.

b. Probability that the sum is 7

$= 6/36 = 1/6$

Probability that first die shows 5

$= 1/6$

Probability when sum is 7 and first die shows 5

$= 1/36$

Joint Probability formula

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

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

Hence they are independent

Homework 1.5

$P(Oil | Texas) = P(Oil / Texas) / P(Tx)$

$= 30\% \times 60\% = 18\%$

$P(Oil/NJ) = 10\%$

$P(Oil \cap NJ) = P(Oil/NJ) / P(NJ)$

$= 10\% \times 10\% = 1\%$

$P(Oil/AK) = 100 - 60\% - 10\%$

$= 30\%$

$P(Oil \cap AR) = P(Oil/AR) / P(AR)$

$= 30\% \times 20\% = 6\%$

a. Probability to find oil

$= 18\% + 6\% + 1\%$

$= 25\%$

b. Probability that they drilled in texas

$= P(TX \cap Oil) / P(Oil)$

$= 18\% / 25\% = 0.72\%$

0.0072

Homework 1.6

a. Probability that passenger not survived = P(not survived) = 1490/2201 = 0.6769

b. Probability that a passenger was staying in first class

P(passenger in first class) = 325/2201 = 0.147

c. P(Passenger = Survived | First class) = 203/711 = 0.2855.

d. P(Survived) = 711/2201 = 0.323

P(First class) = 325/2201 = 0.147

P(Survived ∩ First Class) = 0.2855

P(Survived ∩ First Class)
$\neq$ P(Survived) x P(First Class)
0.323 x 0.147 = 0.0476
Hence not independent

e. P(Survived | First and Child)
= 6/711
= 0.0084

f. P(Survived | Adult)
= 654/711
= 0.919

g. P(Survived | First)
= 203/711
= 0.2855

P(Survived | Age)
= 1

P(Survived | Age | First)
= 0.2855 x 1

$= 0.2855.$

Since $P(\text{First}) \times P(\text{Age}) = P(\text{First} \mid \text{Age})$

Hence independent.