1) Prob. Jerry is at the bank on any given day, P(Jerry) = 0.2

Prob. Susan is at the bank on any given day, P(Susan)= 0.3

Prob. both are at bank, P(both) = 0.08

Susan was at the bank last Monday. What’s the probability that Jerry was there too?

=> Since P(Jerry) and P(Susan) are prob. of non-independent events:-

P(Jerry/Susan) = P(Jerry and Susan) / P(Susan)

P(both) / P(Susan) = 0.08/0.3 = 4/15 **= 0.26**

(ii)

Last Friday, Susan wasn’t at the bank. What’s the probability that Jerry was there?

=> Since P(Jerry) and P(~Susan) are prob. of non-independent events:-

P(Jerry/~Susan) = P(Jerry and ~Susan)/P(~Susan)

= {P(Jerry) -P(both)}/{1-P(Susan)}

= {0.2-0.08}/{1-0.3}

= 0.12/0.7

= 6/35 = **0.17**

(iii)

Last Wednesday at least one of them was at the bank. What is the probability that both of them were there?

From rule of probability:

=> P(A V B) = P(A) + P(B) - P(A Ʌ B)

=> P(atleast 1 is there) = P(Jerry) + P(Susan) – P(Both)

= 0.3 + 0.2 – 0.08

= 0.42

So, P(both)/P(atleast 1) = 0.08/0.42 = 4/21 = **0.19**

1. Prob. Harold gets a B, P(Harold gets B) = 0.8

Prob. Sharon gets a B, P(Sharon gets B) = 0.9

Prob. atleast one gets B, P(Harold V Sharon) = 0.91

(i)

What is the probability that only Harold gets a “B”?

=> P(Harold V Sharon) = P(Harold) + P(Sharon) - P(Harold Ʌ Sharon)

=> 0.91 = 0.8 + 0.9 - P(Harold Ʌ Sharon)

=> P(Harold Ʌ Sharon) = 0.8 + 0.9 – 0.91 = 0.79

=> Prob. that both get ‘B’ in 0.79 or 79pc

=> P(Harold alone gets B) = P(Harold) - P(Harold Ʌ Sharon)

= 0.8 – 0.79 **= 0.01 or 1 %**

(ii)

Similarly, P(Sharon alone gets B) = P(Sharon) - P(Harold Ʌ Sharon)

= 0.9 – 0.79

= **0.11 or 11%**

(iii)

P( Neither gets B) = 1 – P(atleast one gets B) = 1 – 0.91 = **0.09**

1. Prob. Jerry is at the bank on any given day, P(Jerry) = 0.2

Prob. Susan is at the bank on any given day, P(Susan)= 0.3

Prob. both are at bank, P(both) = 0.08

Lets consider 2 scenarios,

i) without any hints, chances that “Susan is at bank” any given day = 30%

ii) if we know Jerry is at bank, then chances that “Susan is at bank”

= P(both at bank)/P(Jerry at bank)

= 0.08/0.2 =40%

So, we observe that prob. of event “Susan is at bank” increases if event “Jerry is at bank” also occurred.

**=> Hence we conclude, the 2 events “ Jerry is at the bank” and “Susan is at the bank” are not independent of each other.**

4)

a) The events are:

A => “the sum is 6”

B => “the second dice gives 5”

Lets, assume we know nothing abt B, then P(A) = 5/36 = 13.88%

Now, prob. of A given B is known, P(A/B) = (Prob. of getting sum 6 if 2nd dice is 5)

= E(1st dice is 1)/Total(E)= 1/6 = 16.66%

So ,we observe that the prob. of event A changes(increases) if B is known.

**Hence we can conclude the 2 events are not independent.**

b) The events are:

A => “the sum is 7”

B => “the first dice gives 5”

Lets, assume we know nothing abt A, then P(B) = 1/6

Now, prob. of B given A is known, P(B/A) = (Prob. of getting 5 on 1st dice if sum is 7)

= E(1st dice is 5)/E(sum is 7)

= 1/6

We observe that knowledge of one event has no effect on our ability to predict the 2nd

**Hence, we conclude that the 2 events are independent.**

1. Prob. that company drills in TX, P(drill in TX) = 0.6

Prob. that company drills in NJ, P(drill in NJ) =0.1

Prob. that company drills in NJ, P(drill in AK) = 0.3

Prob. of finding oil in TX, P(oil in TX) = 0.3

Prob. of finding oil in TX, P(oil in NJ) = 0.1

Prob. of finding oil in TX, P(oil in AK) = 0.2

1. What’s the probability of finding oil?

By law of total probability:

=>P(oil is found) = P(drill in TX)\* P(oil in TX) + P(drill in NJ) \* P(oil in NJ) + P(drill in AK)\*

P(oil in AK)

=> P(oil is found) = 0.6\*0.3 + 0.1\*0.1 + 0.3\*0.2 = 0.18+0.01+0.06 = **0.25 or 25%**

1. The company decided to drill and found oil. What is the probability that they drilled in TX?

=> P(Company find oil in TX) = P(oil is found in TX)/P(company finds oil)

= (0.6\*0.3)/0.25 = 0.18/0.25

= **0.72 or 72%**

6)

(i) P(passenger, incl crews, didn’t survive) = (total not survive)/total

= 1490/2201 = **0.67 or 67%**

(ii) P(passenger staying in first class) = 325/2201 = **0.14 or 14.7%**

1. Given that a passenger survived, what is the probability that the passenger was staying in the first class?

P(passenger survive/ passenger in 1st class) = 203/711 = **28.55%**

1. **No.** (Survival rates are higher in 1st class, which means it is a valuable insight to predict cases of survival).
2. Given that a passenger survived , what is the probability that the passenger was staying in the first class and the passenger was a child?

P((passenger: child and passenger: first class)/ passenger: survive) = **6/711 = 0.84%**

1. P(passenger:adult/passenger:survived) **= 654/711 = 91.98%**
2. **No.** (among the survivors, age can be used to predict whether someone was in first class and vice-versa)