Probability Assignment

**Homework**

**1.1**

Jerry and Susan have a joint bank account.

Jerry goes to the bank 20% of the days.

Susan goes there 30% of the days.

Together they are at the bank 8% of the days.

**30**

**8**

**20**

p(j)=0.2 p(j`)=1-0.2=0.8

p(s)=0.3 p(s`)=1-0.3=0.7

p(j∩s)=0.08

a.

Susan was at the bank last Monday. What’s the

probability that Jerry was there too?

p( j | s)= p(j∩s)/p(s)=0.08/0.3= **26.666%**

b.

Last Friday, Susan wasn’t at the bank. What’s the

probability that Jerry was there?

p( j | s`)= p(j∩s`)/p(s`)=0.2-0.08/0.7=**17.142%**

c.

Last Wednesday at least one of them was at the

bank. What is the probability that both of them were

there?

P ( J ∩ S )/ P( J U S) = P ( J ∩ S )/ (P ( J ) + P ( S ) –P ( J ∩ S))=0.08/0.42=**19.040%**

**Homework**

**1.2**

Harold and Sharon are studying for a test.

Harold’s chances of getting a “B” are 80%. Sharon’s

chances of getting a “B” are 90%.

The probability of at least one of them getting a “B” is

91%.

p(H)=0.80

p(S)=0.90

p(H U S)=0.91

p(H ∩ S)= 0.80+0.90 -0.91=0.79

a.

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

P(H)-p(H ∩ S)=0.8-0.79=**1.00%**

b.

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

P(S)-p(H ∩ S)=0.90-0.79=**11.00%**

c.

What is the probability that both won’t get a “B”?

1-p(H U S)=1-0.91=**9%**

**Homework**

**1.3**

Jerry and Susan have a joint bank account.

Jerry goes to the bank 20% of the days.

Susan goes there 30% of the days.

Together they are at the bank 8% of the days.

Are the events “Jerry is at the bank” and “Susan is at the

bank” independent?

The two events are independent if

*P*(*A* ∩ *B*) = *P*(*A*)*P*(*B*)

Thus

Lhs=

p(j∩s)=0.08

rhs= P(j)p(s)= (0.2)(0.3)=0.6

As lhs which is 8% IS NOT EQUAL to the rhs which is 6%

**Both the events are not independent they are dependent.**

**Homework**

**1.4**

You roll 2 dice.

a.

Are the events “the sum is 6” and “the second die shows

5” independent?

Let A be event that sum is 6

A={(1,5),(2,4),(3,3),(4,2),(5,1)}

n(A)=(5)

p(A)=5/36

Let B be that second die shows 5

B={(1,5),(2,5),(3,5),(4,5),(5,5),(6,5)}

P(B)=6/36

P(A)\*p(B)=0.02314

(A ∩ B)={(1,5)}

P(A ∩ B)=1/36=0.02778

AS P(A) \* P(B) != P(A ∩ B)

**The events are not independent**

b.

Are the events “the sum is 7” and “the first die shows 5”

independent?

let C be the event that sum is 7.

C = { (1,6),(2,5),(3,4),(4,3),(5,2),(6,1)}

n(C) = 6

P(C) = 6/36 = 1/6

Let D be the event that first die show 5

D = { (5,1).(5,2),(5,3),(5,4),(5,5),(5,6)}

n(D) = 6

P(D)=6/36 = 1/6

P(C) \* P(D) = 1/6 \* 1/6 = 1/36

(C ∩ D) = {(5,2)}

P(C ∩ D) = 1/36

AS P(C) \* P(D) = P(C ∩ D)

**The event C and D are independent.**

**Homework**

**1.5**

An oil company is considering drilling in either TX, AK and

NJ. The company may operate in only one state. There is

60% chance the company will choose TX and 10% chance NJ.

There is 30% chance of finding oil in TX, 20% in AK, and 10% in NJ.

1.

What’s the probability of finding oil?

P(Oil) \* P(Tx) = 0.3 \* 0.6 = 0.18 = 18%

P(Oil) \* P(Ak) = 0.2 \* 0.3 = 0.06 = 6%

P(Oil) \* P(Nj) = 0.1 \* 0.1 = 0.01 = 1%

P(oil) = P(oil and TX) + P(oiland AK) + P(oil and NJ) = 18 + 6 + 1 = **25%**

2.

The company decided to drill and found oil. What is the

probability that they drilled in TX?

P(TX or oil) = P(oil and TX) / P(oil)= 0.18 / 0.25 = **72%**

**Homework**

**1.6**

The following slide shows the survival status of individual passengers on theTitanic. Use this information to answer the following questions

1.What is the probability that a passenger did not survive?

P(Not survive)=1490/2201=**67.695%**

2.

What is the probability that a passenger was staying in the first class?

P(first class passenger)=325/2201=**14.766%**

3.

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

P(first class|survived)=203/711=**28.551%**

4.

Are survival and staying in the first class independent?

P(survived)=711/2201=32.033%

p(first class)=325/2201=14.766%

p(first class ∩survived)=203/711=28.55%

As p( A ∩B) is not equal to P(A) \*p(B)

**Both events are not independent.**

5.

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(first class child|survived)=6/711=**0.843%**

6.

Given that a passenger survived

, what is the probability that the passenger was an adult?

P(adult|survived)=654/711=**91.98%**

7.

Given that a passenger survived

, are age and staying in the first class independent?

A=P(Child |survived)=57/711=8.01%

B=P(first class|survived)= 203/711=28.55%

A∩ B=P(child ∩ firstclass|survived=6/203=29.55%

A\*B is not equal to A∩B

**Both events are not independent**