**Assignment – 2**

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Q1

1. Since the die is rolled 6 times, our sample space becomes = 6\*6\*6 = 216
2. We have sample space = 216

Probability of at least 2 = Sample space – probability of no 2s (Pn)

Pn = all rolls have 5 outcomes each as no 2 will come

Pn = 5^3 = 125

Probability of at least 2 = 216-125

= 91

Therefore required probability = 91/216

1. The matlab code :

counter=0;

for 1:1:6

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r = randi([0,6],1,1);

if r==2

counter=counter+1;

end

end

end

d)We have our event = sum of die is 17

Sample space = 216

Events = {(6,6,5),(6,5,6),(5,6,6)}

P(E) = 3/216

e) Sample space= 216

Events = {(1,5,6),(1,6,5)} = 3! \* 2 = 12

P(E) = 12/216

Q2

1. Using marginalization, P(E) = P(E^F1) + P(E^F2)

Where E is probability of a 5 coming up on the second used die

And F1 is the probability of 1 coming on the first die

And F2 is the probability of 1 not coming on the first die (thus using the 20-sided die)

P(E) = (1/6 \* 1/6) + (1/20 \* 5/6) = 0.0694

1. Similarly, we will use E as the probability of 15 coming on the second used die

P(E) = (0 \* 1/6) + (1/20 \* 5/6) = 0.04166

Q3 We know that using Bayes’ theorem

P(A|B) = [P(B|A) \* P(A)]/P(B)

Let A be the event that the suspect has a certain characteristic

Let B be the event that the inspector is convinced of the guilt of the suspect

P(B) = 0.6; P(A|B) =1

And 0.2 is the probability of the total population that possess a characteristic = P(A|!B)

Our goal is to find P(B|A); However, we do not have P(A)

P(A) = [P(A|B) \* P(B)] + [P(!B) \* P(A|!B)]

P(A) = (1\*0.6) + (0.4\*0.2) = 0.68

Therefore, by substituting these values in the formula, we get

P(B|A) = (1\*0.6)/(0.68) = 0.88

Q4

In this question we have to find P(L|O)

In the left table we are given P(L) and in the right table we are given P(O|L) for all the entries

We must use Bayer’s rule to find P(L|O) however we do not have P(O)

P(O) = [P(L) \* P(O|L)] + [P(!L) \* P(O|!L)]

And finally using Bayer’s rule

P(L|O) = [P(O|L) \* P(L)] / P(O)]

Matlab code:

L=c(5,10,5,5, 5,10,5,5 5,5,10,5 5,5,10,5)\*0.01;

matrix(L, byrow=T, nrow=4);

B.L = c(75,95,75,5 5,75,95,75 1,5,75,95 1,1,5,75)\*0.01;

matrix(B.L,byrow=T,nrow=4);

D = sum(B.L\*L);

L.B = (B.L\*L)/D;

sum(L.B);

round(matrix(L.B,byrow=T,nrow=4),3)