**ASSIGNMENT 1 - Probability Questions**

1. What is probability? List down some laws of probability?

The ratio of number of outcomes favourable to an event with respect to total number of outcomes in sample space

P(E) = n(E)

n(S)

P(E) = probability of E

n(E) = number of outcomes favourable to E

n(S) = number of sample space

**LAWS OF PROBABILITY :**

* Addition law of probability
* Multiplication law of probability
* Binomial law of probability

1. **What is the difference between independent and dependent events?**

Dependent events influence probability of other events or their probability of occurring is affected by other events

Ex: Getting into a traffic accident dependent upon driving a vehicle  
 Independent events do not affect one another and do not increase or decrease the probability of another event happening

Ex: Winning a card game and scoring high marks

1. **What is conditional probability? What is the formula to calculate conditional probability?**

The possibility of an event or outcome happening ,based on the existence of a previous event or outcome

P(B|A)=P(A & B)/P(A)

1. **According to hospital records, 30% of patients suffering from a disease will die. Find out the probability that 2 out of the 5 randomly selected patients survive.**

BINOMIAL DISTRIBUTION

P(X:n, p) = nCx px qn-x

n=5, x=2 ,p=70% (0.7) ,q=30% (0.3)

= 5c2 x(0.7)2 x(0.3)5-2

= 5c2x(0.7)2x(0.3)3

= 5! / 2! x 3! x 0.49 x 0.027

= 10x0.49x0.027

= 0.1323

1. [**You pull two cards, one at a time, from a deck of cards, without replacement. What is the probability that the second card you pick has a different colour, or different suit, than the first card?**](https://www.interviewquery.com/questions/different-card)

When first card is drawn 1/52 probability

When second card drawn , probability of same suit or colour is 12/51= 4/17

So probability of desired outcome (different colour or suit ) is 1-4/17= 13/17

1. **How does Probability Mass Function and Probability Density Function differ?**

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| S.no | | Probability mass function | Probability Density Function |
| 1. | | Probability mass function is used for discrete random variables | Probability density function is used for continuous random variables |
| 2. | | It assigns probability to each point in the sample space | It must be integrated over an interval to yield a probability |
| 3. | Ex : Number of Heads in a coin toss | | Ex : Height of a person |

1. [**You roll two dice. What’s the probability of rolling at least one 4? What’s the probability of rolling a 4 given a dice**](https://www.interviewquery.com/questions/n-die)**?**

Getting 4 in 1 is 1/6 and second is 1/6 probability of 4 in both is 1/36

P(AUB)=P(A)+P(B)-P(A&B)

=1/6+1/6-1/36

=11/36

(OR) probability of not getting 4 in one dice=5/6, probability of not getting 4 in 2 dice= 5/6\*5/6=25/36,

So probability of getting atleast one four = 1-25/36 = 11/36

1. **What is the probability of getting a sum less than 8 when two dice are thrown?**

n(A)=21,n(S)=36

P(A)=n(A)/n(s)

= 21/36 = 7/12

1. **If there are 12 horses in a race, numbered 1 to 12, what is the probability that horses bearing number 3, 5 or 8 will win the race?**

Total number of horses=12

Favourable outcome of bearing no 3,5,12= 3

Probability= Favourable outcome/ Total outcome

=3/12

= 1/4