

# Probability Random Variables and Binomial distribution Assignment/Worksheet

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## 13. Probability

### (Random Variables and Binomial Distributions)

**QUESTION 1:** Let  $X$  denote a random variable. The probability that  $X$  can take the values  $x$ , has the following form, where  $k$  is some unknown constant. Find the value of  $k$ .

**QUESTION 2:** From a lot of 30 bulbs which include 6 defectives, a sample of 4 bulbs is drawn at random with replacement. Find the probability distribution of the number of defective bulbs.

**QUESTION 3:** Suppose  $X$  follows the Binomial distribution  $B(6, 1/2)$  Which is the most likely outcome.

**QUESTION 4:** A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability distribution of number of successes.

**QUESTION 5:** The mean and variance of a Binomial distribution for a random variable are 10 and  $5/3$  respectively. Find  $P(X \geq 1)$

**QUESTION 6(i):** You are taking a 10 question multiple choice test. If each question has four choices and you guess on each question, what is the probability of getting exactly 7 questions correct?

**QUESTION 6(ii):** In a box containing 100 bulbs, 10 are defective. The what is the probability that out of a sample of 5 bulbs, none is defective .

**QUESTION 7:** Find the mean of the Binomial distribution  $B(3, \frac{1}{4})$

$X$	0	1	2	3
$P(X)$	$\frac{125}{216}$	$\frac{75}{216}$	$\frac{15}{216}$	$\frac{1}{216}$

**QUESTION 8:**

State True or False with justification : The above distribution can not be the probability distribution of a random variable

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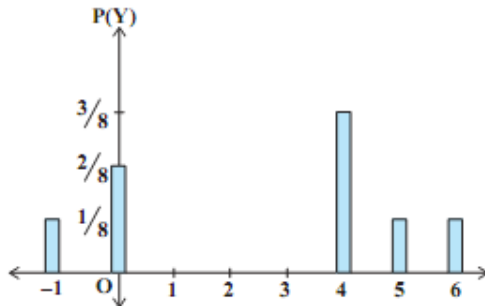
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**QUESTION 9:** Find the mean of the variable Y whose probability distribution is given graphically



**QUESTION 10:** Two cards are drawn simultaneously (or successively without replacement) from a well shuffled pack of 52 cards. Find the mean and standard deviation of the number of kings.

**QUESTION 11:** .

The chances of a patient having a heart attack is 40%. According to latest research Drug A reduces the risk of heart attack by 30% and drug B reduces its chances by 25%. At a time a patient can choose any one of the two options with equal probabilities. It is given that after going through one of the two options the patient selected at random suffers a heart attack. Find the probability that the patient had been prescribed Drug A

**QUESTION 12:**

A random variable X has the following probability distribution , find

(i) The value of K (ii)  $P(X \leq 1)$

X	0	1	2	3	4	5
P(X)	0.1	K	0.2	2K	0.3	K

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**QUESTION 13:** 27. A bag contains 25 balls of which 10 are purple and the remaining are pink. A ball is drawn at random, its colour is noted and it is replaced. 6 balls are drawn in this way, find the probability that

- (i) All balls were purple
- (ii) Not more than 2 were Pink
- (iii) Atleast one ball was pink
- (iv) An equal number of purple and pink balls were drawn.

**QUESTION 14:** Four cards are drawn successively with replacement from a well shuffled deck of 52 cards. What is the probability that

- (i) All the four cards are spades ?
- (ii) Only 3 cards are spades
- (iii) None is a spade

**QUESTION 15:** Find the probability distribution of doublets in three throws of a pair of dice

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