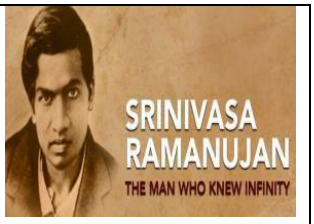
SRM Institute of Science and Technology
Kattankulathur

DEPARTMENT OF MATHEMATICS

18MAB203T Probability and Stochastic Processes

Module – I: Random Variables
Tutorial Sheet - I



Sl.No.	Questions	Answer
	Part – B	
1	If the discrete R.V X has the Probability function given below, Find (i) K (ii) F(x) x: 1 2 3 4 P(x): k/3 k/6 k/3 k/6	K= 1 $F(x)=\begin{cases}0 & x<1\\ \frac{1}{3} & 1\le x<2\\ \frac{3}{6} & 2\le x<3\\ \frac{5}{6} & 3\le x<4\\ 1 & x\ge 4\end{cases}$
2	The Probability function of a random variable X is given by $P(X=x)=\frac{1}{2^x}$ $x=1,2,3.....$ Find (i) P (X is even) (ii) P(X≥4)	(i) 1/3 (ii) 1/8
3	For a continuous R.V X, the CDF is given by $F(x)=\begin{cases}0 & x<2\\ k(x-2) & 2\le x<6\\ 1 & x\ge 6\end{cases}$ Find (i) k (ii)f(x) (iii) P(3<x<5)	(i) ¼ (ii) $f(x)=\begin{cases}\frac{1}{4} & 2\le x<6\\ 0 & otherwise\end{cases}$ (iii) 1/2
4	A Coin is tossed until a head appears. What is the expectation of the number of tosses required?	2
5	The density function of a R.V X is given by $f(x)=kx(2-x)$ $0\le x\le 2$ Find K, Mean, Variance and rth moment.	(i) K=3/4 (ii)E(x)=1 (iii) V(x) =1/5 (iv) $\frac{6*2^r}{(r+2)(r+3)}$
	Part – C	
6	The first three moments about the origin are 5,26,78. Show that the first three moments about the value x=3 are 2, 5, -48.	
7	A Continuous Variable X follows the probability law $f(x)=Ax^2$ $0\le x\le 1$. Determine (i) A (ii) Find the probability that X lies between 0.2 and 0.5 (iii) F(x)	(i) 3 (ii) 0.117

<table>
<tr><td></td><td></td><td>(iii) $F(x)=\begin{cases}0 & x<0\\ x^3 & 0\le x<1\\ 1 & x\ge 1\end{cases}$</td></tr>
<tr><td>8</td><td>A random Variable X has the PDF
$f(x)=\begin{cases}2x & 0<x<1\\ 0 & otherwise\end{cases}$
Find (i) P(X <1/2) (ii) P(1/4< X <1/2) (iii) P (X>3/4 | X>1/2)</td><td>(i) ¼
(ii) 3/16
(iii) 7/12</td></tr>
<tr><td>9</td><td>Consider the following game that involves tossing a fair die. If the outcome of toss is an even number, you will get Rs 2. If the outcome is 1 or 3, you will lose Rs 1. If the outcome is 5, you lose Rs 3. what is the expected gain?</td><td>1/6</td></tr>
<tr><td>10</td><td>If X has the following probability distribution
<table>
<tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>P(x)</td><td>k</td><td>3k</td><td>5k</td><td>7k</td><td>9k</td></tr>
</table>
Find (i)K, (ii) mean (iii) variance (iv) E(3X-4) and (v) Var(3X-4)</td><td>(i) k=1/25
(ii) 14/5
(iii)34/25
(iv)22/5
(v) 306/25</td></tr>
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