Indian Institute of Information Technology, Vadodara (IIITV)
IIITV- International Campus Diu

# Probability and Statistics (MA201)

## TUTORIAL 6

---

1. For the transformation $Y = X^2$. Find the PDF for $Y$ given the PDF of $X$ in each case:
   1. $f_X(x) = \frac{1}{6}\sum_{i=1}^{6}\delta(x-i)$
   2. $f_X(x) = \frac{1}{6}\sum_{i=-2}^{3}\delta(x-i)$
2. If $Y = 2X + 3$ and PDF of random variable $X$ is
$$f_X(x) = \begin{cases} 3x^2, & 0 < x < 1 \\ 0, & otherwise. \end{cases}$$
then find PDF of Y.
3. If $Y = X^2$ and PDF of random variable $X$ is $f_X(x)$ then find PDF of Y . Take $X$ as Gaussian random variable $Z \sim N(0,1)$ $(\mu = 0, \sigma = 1)$ then find $f_Y(y)$.
4. If $Y = \ln X$ and PDF of random variable X is
$$f_X(x) = \frac{\theta}{x^{\theta+1}}, x > 1, \theta > 0,$$
then find PDF of $Y$.
5. If $Y = \frac{X-a}{b-a}$ and PDF of random variable X is
$$f_X(x) = \begin{cases} \frac{1}{b-a}, & a < x < b \\ 0, & otherwise, \end{cases}$$
then find PDF of $Y$.
6. Let $X$ and $Y$ be two statistically independent random variables with joint PDF $f_{X,Y}(x,y)$. Let $Z = X + Y$ and $W = Y$. Find $f_Z(z)$.
7. Let $X_1, X_2$ and $X_3$ are RVs. Consider,
$$Y_1 = X_1^2 - X_2^2$$
$$Y_2 = X_1^2 + X_2^2$$
$$Y_3 = X_3.$$
Find expression for $f_{Y_1,Y_2,Y_3}(y_1,y_2,y_3)$ for given $f_{X_1,X_2,X_3}(x_1,x_2,x_3)$. If
$$f_{X_1,X_2,X_3}(x_1,x_2,x_3) = \frac{1}{(2\pi)^{3/2}} e^{-\frac{1}{2}(x_1^2+x_2^2+x_3^2)}, where -\infty < x_1, x_2, x_3 < \infty$$
, find $f_{Y_1,Y_2,Y_3}(y_1,y_2,y_3)$.

**********

**Best wishes**