MANIPAL INSTITUTE OF TECHNOLOGY
BENGALURU
(A constituent unit of MAHE, Manipal)

Assignment

Engineering Mathematics IV

MAT_2226/MAT_2256

Number of questions:8   **Due date: April 8, 2024**

1. If the continuous random variable X has pdf $f(x) = \frac{2}{9}(x+1)$, in -1 < x < 2 and is equal to zero elsewhere, find the pdf of $Y = X^2$.
2. If X and Y are independent RVs each following N (0,2) then show that $(2X + 3Y) \sim N(0, 2\sqrt{13})$.
3. If X and Y each follow an exponential distribution with parameter "1" and are independent, find the pdf of X-Y.
4. The top 5% of applicants (as measured by GRE scores) will receive scholarships. If GRE ~ $N(500, 100^2)$, how high does your GRE score have to be to qualify for a scholarship?
5. Weather records show that for a certain airport during the winter months an average of one day in 25 is foggy enough to prevent landings. What is the probability that in a period of seven winter days landings are prevented on
   - (i)   2 or more days?
   - (ii) No days?
6. A continuous random variable X that can assume any value between x=2 and x=5 has a density function given by f(x)=k(1+x). Find P(X<4).
7. A random variable X has mean 3 and Variance 2. Use Chebyshev's Inequality to obtain an upper bound for (a) P(|X-3|≥2), (b) P(|X-3|≥1).
8. Let X and Y be continuous random variables have joint density function.
   f (x, y) = $\{c(x^2 + y^2), 0 \leq x \leq 1, 0 \leq y \leq 1\}$ otherwise 0.
   Determine:
   (a) the constant c,
   (b) P $(X < \frac{1}{2}, Y > \frac{1}{2})$,
   (c) P $(\frac{1}{4} < X < \frac{3}{4})$ (d) P $(Y < \frac{1}{2})$
   (e) whether X and Y are independent.

Note:

1. Submit the hard copy to your respective faculty on or before due date.
2. Late submissions are subjected to mark deduction.