

## Quiz: Probability and Statistics (40 Marks)

**Each question: 10 marks**

1. Let  $X$  be a Uniform  $U[a, b]$  random variable. Let  $Y = e^{2X}$ . Find pdf and cdf of  $Y$ .
2. Let  $X$  be a Binomial random variable with parameters  $n$  and  $p$ . Derive expression for the first two moments of  $X$ .
3. Define the following : 1) A random variable 2) Borel sigma algebra. For a random variable  $X$  describe all possible relationships between  $\mathbb{P}$ ,  $P_X$  and  $F_X(\cdot)$ .
4. Derive the expression for the mean of an exponential random variable with parameter  $\lambda$ . Also prove the memoryless property for the exponential random variable.