

End of Semester Practice Problems

Math 262

1. Let X and Y be iid exponential rvs with parameter λ . Let (R, Θ) be the polar coordinates of (X, Y) . What is the joint density of R and Θ ?
2. Let X_1, X_2, \dots, X_{10} be random variables denoting bids on an item that is for sale in an auction. The item will be sold to the highest bidder. If the bids are independent and uniformly distributed between 10 and 30, what is the expected value of the sale price?
3. Suppose $f(x)$ and $g(x)$ are probability density functions. Under what conditions on the constants α and β will the function $\alpha f(x) + \beta g(x)$ be a probability density function?
4. Let $X \sim \text{Exp}(\lambda)$ and $0 \leq s \leq t$. Since X is memoryless, is it true that $(X > s + t)$ and $(X > t)$ are independent events?
5. Suppose B and C are iid $\text{Unif}[0, 1]$. Find the probability that the roots of the equation $x^2 + Bx + C = 0$ are real.
6. Among 30 raffle tickets, six are winners. Felicia buys 10 tickets. Find the probability that she gets exactly three winners.