

Math Question

Problem 1

A joint continuous probability distribution function (pdf) for the random variables X and Y is given by

$$p_{XY}(x, y) = A(x + y)^2 e^{-(x+y)}$$

for $1 < x < \infty$ and $1 < y < \infty$.

- Find A .
- Find the marginal probability distributions $p_X(x)$ and $p_Y(y)$.
- Are the random variables X and Y independent? (No credit without justification.)

Problem 2

Solve the following differential equation

$$\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 40y(t) = 60$$

subject to the initial conditions $y'(0) = y(0) = 1$.

- Sketch the solution over the range of $0 < t < 2$.
- Assuming this solution describes the behavior of a RLC circuit, describe the nature of the response