

KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
ELECTRICAL ENGINEERING DEPARTMENT

EE 315

Quiz #5

Name: _____

Solution

ID#: _____

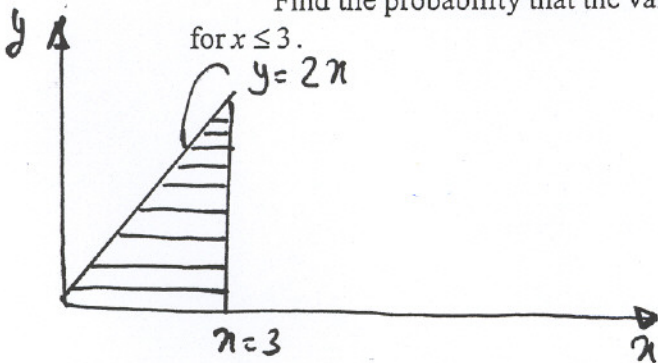
Section No: _____

Q1: The joint density of the random variables X and Y is given by

$$f_{X,Y}(x,y) = 2 \exp\left[-\left(\frac{x}{2} + 4y\right)\right] u(x)u(y)$$

Find the probability that the values of Y are not greater than twice the values of X

for $x \leq 3$.



$$= \left[1 - e^{-3/2} + \frac{e^{-5/2}}{17} - 1 \right]$$

$$= \frac{16 - 17e^{-3/2} + e^{-5/2}}{17}$$

$$P\{Y \leq 2X, X \leq 3\}$$

$$= \int_0^3 \int_0^{2x} 2e^{-x/2} e^{-4y} dy dx$$

$$= 2 \int_0^3 e^{-x/2} \left[\frac{e^{-4y}}{-4} \right]_0^{2x} dx$$

$$= \frac{1}{2} \int_0^3 e^{-x/2} (1 - e^{-8x}) dx$$

$$= \frac{1}{2} \left[\frac{e^{-x/2}}{-1/2} \Big|_0^3 - \frac{e^{-8x - x/2}}{-17/2} \Big|_0^3 \right]$$

$$= \frac{1}{2} \left[\frac{1 - e^{-3/2}}{1/2} + \frac{e^{-5/2} - 1}{17/2} \right]$$