Philadelphia University
Faculty of Engineering

Marking Scheme

Examination Paper

Department of Communication & Electronics Engineering

Probability and Random Variables

Third Quiz First semester Date: 08/01/2020

Section 1

Weighting 6% of the module total

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Marking Scheme

Probability and Random Variables *(650364)*

The presented quiz questions are organized to overcome course material through 1 question.

Marking Assignments

Question 1: This question is attributed with 5 marks if answered properly,

Solution

For these random variables the conditional density of ***X*** given ***Y = y*** is

$$f(x|y) = \begin{cases} \dfrac{2x+4y}{1+4y} & \text{for } 0<x<1 \\ 0 & \text{elsewhere} \end{cases}$$

So that

$$f\left(x\middle|\frac{1}{2}\right) = \begin{cases} \dfrac{2}{3}(x+1) & \text{for } 0<x<1 \\ 0 & \text{elsewhere} \end{cases}$$

Thus, $\mu_{X|\,½}$ is given by

$$E\left(X\middle|\frac{1}{2}\right) = \int_0^1 \frac{2}{3}x(x+1)\,dx = \frac{5}{9}$$

Next, we find

$$E\left(X^2\middle|\frac{1}{2}\right) = \int_0^1 \frac{2}{3}x^2(x+1)\,dx = \frac{7}{18}$$

and it follows that

$$\sigma^2_{X|\frac{1}{2}} = \frac{7}{18} - \left(\frac{5}{9}\right)^2 = \frac{13}{162}$$