



Birzeit University
Faculty of Engineering and Technology
Department of Electrical and Computer Engineering
Probability and Engineering Statistics – ENEE 2307
Quiz #3

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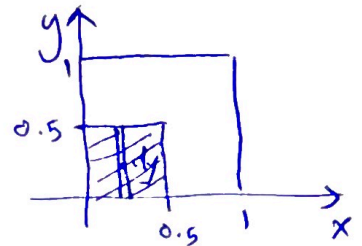
Time: 10 min

Student Name: Key Solution

ID Number:

For the joint pdf $f_{XY}(x,y)$ defined below,

$$f_{XY}(x,y) = \begin{cases} 4xy & 0 < x < 1, 0 < y < 1 \\ 0 & \text{otherwise} \end{cases}$$



a) Determine $P(X \leq 0.5, Y \leq 0.5)$

$$\begin{aligned} &= \int_0^{0.5} \int_0^{0.5} 4xy \, dx \, dy \quad \text{or} \quad \int_0^{0.5} \int_0^{0.5} 4xy \, dy \, dx = \int_0^{0.5} 4x \left(\frac{y^2}{2} \Big|_0^{0.5} \right) dx \\ &= \int_0^{0.5} 4x \left(\frac{0.5^2}{2} - 0 \right) dx = \int_0^{0.5} 0.5x \, dx = \\ &= \left. \frac{0.5x^2}{2} \right|_0^{0.5} \\ &= 0.25(0.5^2 - 0^2) = 0.0625 \end{aligned}$$

b) Determine $P(Y > X)$

$$\begin{aligned} &\int_0^1 \int_x^1 4xy \, dy \, dx = \int_0^1 4x \left(\frac{y^2}{2} \Big|_x^1 \right) dx \\ &= \int_0^1 4x \left(\frac{1}{2} - \frac{x^2}{2} \right) dx \\ &= \int_0^1 2x - 2x^3 \, dx \\ &= \left. \frac{2x^2}{2} - 2 \frac{x^4}{4} \right|_0^1 = x^2 - \frac{x^4}{2} \Big|_0^1 \\ &= 1 - \frac{1}{2} = \frac{1}{2} \end{aligned}$$

