MATH 321: Homework 15

Due _____ : Turn in a hard copy, neat and stapled.

1. An actuary determines that the annual number of tornadoes in counties X and Y are jointly distributed as follows:

y \ x	0	1	2	3
0	.12	.06	.05	.02
1	.13	.15	.12	.03
2	.05	.15	.10	.02

   (a) Construct pmf tables for the following conditional random variables: $X \mid Y = 1$ and $Y \mid X = 2$.

   ** Round to 2 decimals.

   (b) Find the following conditional probabilities:

   $P(X \geq 1 \mid Y = 1)$, $P(X + Y \leq 2 \mid Y = 1)$ and $P(Y^2 \leq 2 \mid X = 2)$.

2. Let (X, Y) be a bivariate continuous random vector with joint pdf

$$f(x, y) = \frac{1}{4}(3x^2 + 2 - y) \quad \text{for } 0 \leq x \leq 1, 0 \leq y \leq 2$$

   Find the conditional expected value $E(X^3 \mid Y = 0.6)$.

3. The stock prices of two companies at the end of any given year are modeled with random variables X and Y that follow a distribution with joint density function

$$f(x, y) = 2x \quad \text{for } 0 < x < 1, x < y < x + 1$$

   Find the conditional variance $V(Y \mid X = x)$.

Select answers

1. (a)

   (b) $P(X \geq 1 \mid Y = 1) = 0.70$, $P(X + Y \leq 2 \mid Y = 1) = 0.65$ and $P(Y^2 \leq 2 \mid X = 2) = 0.63$

2. $E(X^3 \mid Y = 0.6) = 17/48$

3. $V(Y \mid X = x) = 1/12$