MATH 3332, Chapter 5 Exercise — Part 1

Problems:

1. Let X be a random variable. Suppose that X has pdf

$$f(x) = \frac{2}{21}(2+x), \quad 0 < x < 3.$$

Find the pdf of $Y = X^2$.

Answer.

$$g(y) = \frac{\sqrt{y}+2}{21\sqrt{y}}, \quad 0 < y < 9.$$

2. Let X be a random variable. Suppose that X has pdf

$$f(x) = \frac{2}{21}(2+x), \quad 0 < x < 3.$$

Find the pdf of $Y = \sqrt{X}$.

Answer.

$$g(y) = \frac{4y(y^2+2)}{21}, \quad 0 < y < \sqrt{3}.$$

3. Let X, Y be random variables. Suppose that X and Y are independent, and

$$E(X) = 3, \quad E(Y) = 4, \quad Var(X) = 5, \quad Var(Y) = 6.$$

(a) Find $E(2X)$.

Answer.

$$E(2X) = 6.$$

(b) Find $E(2XY)$.

Answer.

$$E(2XY) = 24.$$

(c) Find $Var(3Y)$.

Answer.

$$Var(3Y) = 54.$$

(d) Find $E(2X + 3Y)$.

Answer.

$$E(2X + 3Y) = 18.$$

(e) Find $E(2X - 3Y)$.

Answer.

$$E(2X - 3Y) = -6.$$

(f) Find $Var(2X - 3Y)$.

Answer.

$$Var(2X - 3Y) = 74.$$