HW3

2024-09-28

1.

2.23(b)

Question 1

Let X have the pdf

$$f(x) = \frac{1}{2}(1+x)$$

, $-1 < x < 1$

Define the random variable Y by $Y = X^2$

(b) Find $E(Y)$ and Var(Y).

Answer 1

(b)

2.

Question 2

A family continues to have children until they have one female child. Suppose, for each birth, a single child is born and the child is equally likely to be male or female. The gender outcomes are independent across births. (a): Let X be a random variable representing the number of children born to this family. Find the distribution of X.

(b): Find the expected value $E(X)$

(c): Let X_m denote the number of male children in this family and let X_f denote the number of female children. Find the expected value of X_m and the expected value of X_f

Answer 2

(a):

(b):

(c):

3.

2.30 (a), (b), (c)

Question 3

Answer 3

4.

2.31

Question 4

Answer 4

5.

Question 5

(a):

(b):

Answer 5

(a):

(b):

6.

Question 6

Answer 6

7.

Question 7

Suppose that X has pmf $f(x) = p(1-p)^{x-1}$, for $x = 1, 2, 3, ...$ where $0 < p < 1$. Find the mgf $M_X(t)$ and use this to derive the mean and variance of X.

Answer 7

8.

Question 8

Answer 8