HW 6

Thursday, October 22, 2020 3:20 PM

1.

a)

$$\int_1^5 \frac{1}{12} x\,(x)dx = \frac{1}{12}\left(\frac{x^3}{3}\right)\Big|_1^5 = \frac{31}{9}$$

Answer: $\frac{31}{9}$

b)

$$\int_1^5 \frac{1}{12} x\,(x^2)dx = 13 = E(X^2)$$

$$13 - \left(\frac{31}{9}\right)^2 = \frac{92}{81}$$

Answer: $\frac{92}{81}$

c)

$$\int_1^5 \frac{1}{12} x\left(e^{x^2}\right)dx = \frac{1}{24}e^u\Big|_1^{25} = \frac{e^{25}-e}{24}$$

Answer: $\frac{e^{25}-e}{24}$

2.

a)

$Y = 2X^2 - 1$
$E(Y) = E(2X^2 - 1) = 2E(X^2) - 1$
$2(13) - 1 = 25$

Answer: 25

b)

$$\frac{1}{12}(2X^2 - 1) = f(Y) = \frac{1}{6}(X^2) - \frac{1}{12} \quad x \in [1,5]$$

$\text{CDF} = \int pdf = \frac{1}{18}x^3 - \frac{1}{12}x : x \in [1,5]$

c)

$PDF(X) = \frac{1}{6}X^2 - \frac{1}{12} : x \in [1,5]$
(solved above)

3.

a)

$$Markov = \frac{\mu}{a} = \frac{55}{65}$$

Answer: $\frac{55}{65}$

b)

$$Chebyshev \leq \frac{\sigma^2}{a^2} = \frac{25}{100}$$

div by 2

Answer: $\frac{12.5}{100}$

c)

$P(X \geq 65)\ \mu = 55\ \sigma = 5$
$= 0.023$

Answer: It's within the chebyshev bounds better than the markov bounds. $P(X \geq 65) = 0.023$

4.

couldn't finish