Expectation of a Polynomial from mean and variance

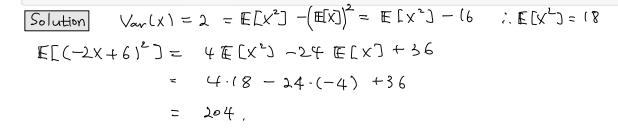
Let X be a random variable with $\operatorname{E}(X) = -4$ and $\operatorname{Var}(X) = 2$. Find $\operatorname{E}((-2X+6)^2)$.

Answer = number (3 significant figures)

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New variant



Density Function

Let f(x) be a probability density function given by

$$f(x) = egin{cases} cx^4(2-x), & 0 < x < 2, \\ 0, & ext{otherwise.} \end{cases}$$

Find the value of c?

Answer = number (3 significant figures)

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Solution
$$\int_{\mathbb{R}} f(x) dx = \int_{0}^{2} C x^{4} (2-x) dx$$

$$= C \left[2 \int_{0}^{2} x^{4} dx - \int_{0}^{2} x^{5} dx \right]$$

$$= C \left[2 \cdot \frac{1}{5} \cdot 2^{5} - \frac{1}{6} \cdot 2^{6} \right]$$

$$= \frac{64}{30} \cdot C = 1 : C = \frac{30}{64}$$

Probability Density?

Let f(x) and g(x) be two probability density functions. Then 1.7f(x) - 0.7g(x) is also a probability density function.

- (a) True
- (b) False

Let f(x) and g(x) be two probability density functions. Then 0.4f(x) + 0.6g(x) is also a probability density function.

- (a) False
- X (b) True

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New variant

Solution () If how of () + pg () with oth =1, d>0, p>0 then $\int_{\mathbb{R}} h(x) dx = d \cdot \int_{\mathbb{R}} f(x) dx + \beta \int_{\mathbb{R}} g(x) dx = d + \beta = 1$ and $h(x) \neq 0$. Thus $h(x) \neq 0$ is a PDF.

(2) If d or B is negative, h(x) could be negotive for some x G.R. Thus h may not be a PDF in greneral.

Uniform Probability

Let U be a uniform random variable on (6,43). Find $\mathbb{P}(U \in (10,12) \cup (35,42))$.

number (3 significant figures) Answer =

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New variant

Since the PDF is $f(x) = \sqrt{\frac{1}{43-6}}$, $6 \le x \le 43$ Solution

$$\mathbb{P}\left(\forall f \in (10, 12) \cup (35, 42)\right)$$

$$= \int_{10}^{12} \frac{1}{37} dx + \int_{35}^{42} \frac{1}{37} dx = \frac{1}{37} \cdot (2+7) = \frac{4}{37}$$