

EXAM P QUESTIONS OF THE WEEK

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Week of January 28/08

A loss random variable is uniformly distributed on the interval $(0, 2000)$.

An insurance policy on this loss has an ordinary deductible of 500 for loss amounts up to 1000. If the loss is above 1000, the insurance pays half of the loss amount.

Find the standard deviation of the amount paid by the insurance when a loss occurs.

- A) Less than 250 B) At least 250, but less than 300 C) At least 300, but less than 350
D) At least 350, but less than 400 E) At least 400

The solution can be found below.

Week of January 28/08 - Solution

The amount paid by the insurance is Y , where $Y = \begin{cases} 0 & \text{if } X \leq 500 \\ X - 500 & \text{if } 500 < X \leq 1000 \\ \frac{X}{2} & \text{if } 1000 < X < 2000 \end{cases}$.

$$\text{Var}(Y) = E(Y^2) - [E(Y)]^2.$$

$$E(Y) = \int_{500}^{1000} (x - 500) \times \frac{1}{2000} dx + \int_{1000}^{2000} \frac{x}{2} \times \frac{1}{2000} dx = \frac{125}{2} + 375 = \frac{875}{2}.$$

$$E(Y^2) = \int_{500}^{1000} (x - 500)^2 \times \frac{1}{2000} dx + \int_{1000}^{2000} \left(\frac{x}{2}\right)^2 \times \frac{1}{2000} dx = \frac{62,500}{3} + \frac{875,000}{3} = \frac{937,500}{3}.$$

$$\text{Var}(Y) = \frac{937,500}{3} - \left(\frac{875}{2}\right)^2 = 121,093.75.$$

Standard deviation of Y is $\sqrt{\text{Var}(Y)} = \sqrt{121,093.75} = 348$.

Answer: C