

57. Solution: B

We are given that $M_X(t) = \frac{1}{(1-2500t)^4}$ for the claim size X in a certain class of accidents.

First, compute $M_X'(t) = \frac{(-4)(-2500)}{(1-2500t)^5} = \frac{10,000}{(1-2500t)^5}$

$$M_X''(t) = \frac{(10,000)(-5)(-2500)}{(1-2500t)^6} = \frac{125,000,000}{(1-2500t)^6}$$

Then $E[X] = M_X'(0) = 10,000$

$$E[X^2] = M_X''(0) = 125,000,000$$

$$\text{Var}[X] = E[X^2] - \{E[X]\}^2 = 125,000,000 - (10,000)^2 = 25,000,000$$

$$\sqrt{\text{Var}[X]} = 5,000 .$$