67. Solution: B

The amount of money the insurance company will have to pay is defined by the random variable

$$Y = \begin{cases} 1000x & \text{if} \quad x < 2 \\ 2000 & \text{if} \quad x \geq 2 \end{cases}$$

where x is a Poisson random variable with mean 0.6 . The probability function for X is

$$p(x) = \frac{e^{-0.6}(0.6)^k}{k!} \qquad k = 0, 1, 2, 3\cdots \text{ and}$$

$$E[Y] = 0 + 1000(0.6)e^{-0.6} + 2000e^{-0.6}\sum_{k=2}^{\infty}\frac{0.6^k}{k!}$$

$$= 1000(0.6)e^{-0.6} + 2000\left(e^{-0.6}\sum_{k=0}^{\infty}\frac{0.6^k}{k!} - e^{-0.6} - (0.6)e^{-0.6}\right)$$

$$= 2000e^{-0.6}\sum_{k=0}^{\infty}\frac{(0.6)^k}{k!} - 2000e^{-0.6} - 1000(0.6)e^{-0.6} = 2000 - 2000e^{-0.6} - 600e^{-0.6}$$

$$= 573$$

$$E\left[Y^2\right] = (1000)^2(0.6)e^{-0.6} + (2000)^2 e^{-0.6}\sum_{k=2}^{\infty}\frac{0.6^k}{k!}$$

$$= (2000)^2 e^{-0.6}\sum_{k=0}^{\infty}\frac{0.6^k}{k!} - (2000)^2 e^{-0.6} - \left[(2000)^2 - (1000)^2\right](0.6)e^{-0.6}$$

$$= (2000)^2 - (2000)^2 e^{-0.6} - \left[(2000)^2 - (1000)^2\right](0.6)e^{-0.6}$$

$$= 816{,}893$$

$$\text{Var}[Y] = E\left[Y^2\right] - \{E[Y]\}^2 = 816{,}893 - (573)^2 = 488{,}564$$

$$\sqrt{\text{Var}[Y]} = 699$$