

85. Solution: B

Denote the policy premium by P . Since x is exponential with parameter 1000, it follows from what we are given that $E[X] = 1000$, $\text{Var}[X] = 1,000,000$, $\sqrt{\text{Var}[X]} = 1000$ and $P = 100 + E[X] = 1,100$. Now if 100 policies are sold, then Total Premium Collected = $100(1,100) = 110,000$

Moreover, if we denote total claims by S , and assume the claims of each policy are independent of the others then $E[S] = 100 E[X] = (100)(1000)$ and $\text{Var}[S] = 100 \text{Var}[X] = (100)(1,000,000)$. It follows from the Central Limit Theorem that S is approximately normally distributed with mean 100,000 and standard deviation = 10,000. Therefore,

$$P[S \geq 110,000] = 1 - P[S \leq 110,000] = 1 - P\left[Z \leq \frac{110,000 - 100,000}{10,000}\right] = 1 - P[Z \leq 1] = 1$$

$- 0.841 \approx 0.159$.