

103. Solution: E

Let  $X_1, X_2$ , and  $X_3$  denote annual loss due to storm, fire, and theft, respectively. In addition, let  $Y = \text{Max}(X_1, X_2, X_3)$  .

Then

$$\begin{aligned}\Pr[Y > 3] &= 1 - \Pr[Y \leq 3] = 1 - \Pr[X_1 \leq 3] \Pr[X_2 \leq 3] \Pr[X_3 \leq 3] \\ &= 1 - (1 - e^{-3}) \left(1 - e^{-3/1.5}\right) \left(1 - e^{-3/2.4}\right) \quad * \\ &= 1 - (1 - e^{-3}) (1 - e^{-2}) \left(1 - e^{-5/4}\right) \\ &= 0.414\end{aligned}$$

\* Uses that if  $X$  has an exponential distribution with mean  $\mu$

$$\Pr(X \leq x) = 1 - \Pr(X \geq x) = 1 - \int_x^{\infty} \frac{1}{\mu} e^{-t/\mu} dt = 1 - \left(-e^{-t/\mu}\right) \Big|_x^{\infty} = 1 - e^{-x/\mu}$$