The number of days that elapse between the beginning of a calendar year and the moment a high-risk driver is involved in an accident is exponentially distributed. An insurance company expects that 30% of high-risk drivers will be involved in an accident during the first 50 days of a calendar year. What portion of high-risk drivers are expected to be involved in an accident during the first 80 days of a calendar year?

A. 0.15  B. 0.34  C. 0.43  D. 0.57  E. 0.66

Solution.
Let $T$ be the number of days that elapse before a high-risk driver is involved in an accident. We know that $T$ is exponentially distributed with unknown parameter $\lambda$. We are also given that

$$0.3 = \Pr(T \leq 50) = 1 - e^{-50\lambda}.$$ 

Therefore, $e^{-50\lambda} = 0.7$ and

$$\lambda = -\frac{\ln 0.7}{50}.$$ 

It follows that

$$\Pr(T \leq 80) = 1 - e^{-80\lambda} = 1 - e^{80 \cdot -\frac{\ln 0.7}{50}} = 1 - 0.7^{\frac{80}{50}} = 0.435.$$ 

Answer C.

© Copyright 2004-2008 by Krzysztof Ostaszewski.
All rights reserved. Reproduction in whole or in part without express written permission from the author is strictly prohibited.
Exercises from the past actuarial examinations are copyrighted by the Society of Actuaries and/or Casualty Actuarial Society and are used here with permission.