

Ewa Kubicka

<http://www.math.louisville.edu/~ewa/>

Course MLC/MFE seminars: <http://www.math.ilstu.edu/actuary/prepcourses.html>

Course MLC Casualty/Property Manual: <http://www.neas-seminars.com/registration/>

Practice Problem for exam MLC for the week after 12/15/07.

Job offers for a college graduate with actuarial major arrive according to a Poisson process with mean 4 per month. A job offer is acceptable if the wages are at least \$50,000. Wages offered are mutually independent and follow a lognormal distribution with $\mu = 10.5$ and $\sigma = 0.2$. Calculate the probability that it will take a college graduate more than 2 months to receive an acceptable job offer.

- A. Less than 0.3
- B. At least 0.3 but less than 0.4
- C. At least 0.4 but less than 0.5
- D. At least 0.5 but less than 0.6
- E. At least 0.6

Solution (Like in November 2000 Course 3 Examination, Problem No. 29).

Let T be the random time until the acceptable job, in months. Let $\{N(t), t \geq 0\}$ be the job offer process. Decompose the process into acceptable offers $\{N_1(t), t \geq 0\}$ and unacceptable offers $\{N_2(t), t \geq 0\}$. Let W be the random wage offered. The probability that a random offer is acceptable is

$$\begin{aligned} p &= \Pr(W > 50000) = \Pr\left(\frac{\ln W - 10.5}{0.2} > \frac{\ln 50000 - 10.5}{0.2}\right) = \\ &= 1 - \Phi\left(\frac{\ln 50000 - 10.5}{0.2}\right) \approx 0.05492237. \end{aligned}$$

$\{N_1(t), t \geq 0\}$ is a Poisson process with

$$\lambda_1 = \lambda \cdot p = 4 \cdot 0.05492237 \approx 0.21968946.$$

The waiting time (in months) until an offer is exponential with mean equal to the hazard rate of 0.21968946, so that

$$\begin{aligned} \Pr(\text{no acceptable offers in 2 months}) &= \\ &= \Pr(T > 2) = e^{-2 \cdot 0.21968946} \approx 0.64443654. \end{aligned}$$

Answer **E**.

© Copyright 2007 by Ewa Kubicka. All rights reserved. Reproduction in whole or in part without written permission from the author is strictly prohibited.