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 03/29/08.

Busses arrive at your bus stop at a Poisson rate of 10 per hour. 30% of busses are express busses and 70% are standard busses. The types and number of busses arriving are independent. An express bus gets you to work in 12 minutes and a standard bus gets you to work in 24 minutes. You always take the first bus and your co-worker always takes the first express bus.

Calculate the conditional probability that you arrive at work before your co-worker, given that a standard bus arrives first.

A) less than 0.51
B) at least 0.51 but less than 0.52
C) at least 0.52 but less than 0.53
D) at least 0.53 but less than 0.54
E) more than 0.54

**Solution.**

Since you are going to take a standard bus, you will arrive to work 24 minutes after the first bus arrives (we know it is standard).

Your worker will wait for an express bus and then ride for 12 minutes.

Therefore, you will be at work before him if he would be waiting for his bus for more than (24-12) 12 minutes.

Let $W$ be the waiting time for an express bus. Since Express busses arrive with Poisson rate of (10)(0.3) = 3 per hour, $W$ has an exponential distribution with mean $\theta = \frac{1}{3}(hour) = 20$ minutes.

Pr(you arrive at work before your co-worker | given that a standard bus arrives first) =

$= \Pr(W > 12) = e^{-\frac{12}{20}} = e^{-0.6} =$ **0.5488**.

**ANSWER: E**