

Question #227

Answer: E

At duration 1

K_x	${}_1L$	Prob
$\frac{K_x}{1}$	$\frac{{}_1L}{v - P_{x:2}^1}$	$\frac{\text{Prob}}{q_{x+1}}$
>1	$0 - P_{x:2}^1$	$1 - q_{x+1}$

So $Var({}_1L) = v^2 q_{x+1} (1 - q_{x+1}) = 0.1296$

That really short formula takes advantage of
 $Var(aX + b) = a^2Var(X)$, if a and b are constants.

Here $a = v$; $b = P_{x:2}^1$; X is binomial with $p(X = 1) = q_{x+1}$.

Alternatively, evaluate $P_{x:2}^1 = 0.1303$

$${}_1L = 0.9 - 0.1303 = 0.7697 \text{ if } K_x = 1$$

$${}_1L = 0 - 0.1303 = -0.1303 \text{ if } K_x > 1$$

$$E({}_1L) = (0.2)(0.7697) + (0.8)(-0.1303) = 0.0497$$

$$E({}_1L^2) = (0.2)(0.7697)^2 + (0.8)(-0.1303)^2 = 0.1320$$

$$Var({}_1L) = 0.1320 - (0.0497)^2 = 0.1295$$