

## Solution #298

$$\text{Benefit} = 5000$$

Annual forward rates are interest rates in effect  
from  $t$  to  $t+1$

Let  $Z$  be the present value of the death benefit  
random variable

$$Z = 5000 \cdot v(K_x + 1)$$

$$v(n) = \prod_{k=1}^n (1 + f_{k-1,k})^{-1}$$

$$E[Z^2] = \sum_{k=0}^{\infty} [5000 \cdot v(K_x + 1)]^2 \cdot {}_k|q_{50}$$

$$= \left[ \frac{5000}{1.030} \right]^2 (0.005) + \left[ \frac{5000}{1.030(1.032)} \right]^2 (1-0.005)(0.006)$$

$$+ \left[ \frac{5000}{1.030 \cdot 1.032 \cdot 1.035} \right]^2 (1-0.005)(1-0.006)(0.007)$$

$$= 392,917$$

$$\approx 392,000$$

(A)