MLC #294

$q_x = .05$

$P(I = 1) = 0.1$

X_N ~ PV benefits for N policies

I ~ Indicator RV if stock index below value at start of year

$$Var(X_N) = E[Var(X_N|I)] + Var[E(X_N|I)]$$

	$I=0$	$I=1$
$Var(X_N\|I)$	0	$44773n$
$E(X_N\|I)$	0	$48.544n$

$$E(X_N|I=1) = n(.05)\left(\frac{1000}{1.03}\right) = 48.544n$$

$$Var(X_N|I=1) = n(.05)(.95)\left(\frac{1000}{1.03}\right)^2 = 44773n$$

note: $Var(X) = q(1-q)(b-a)^2$

$$E[Var(X_N|I)] = (0.1)(44773n) = 4477.3n$$

$$Var[E(X_N|I)] = (0.1)(0.9)(48.544n)^2 = 212.09n^2$$

$$Var(X_N) = 4477.3n + 212.09n^2$$

$$\frac{\sqrt{Var(X_{10})}}{10} = \frac{\sqrt{4477.3(10) + 212.09(10)^2}}{10} = 25.67$$

$$\lim_{N\to\infty} \frac{\sqrt{4477.3n + 212.09n^2}}{n}$$

$$= \lim_{N\to\infty} \sqrt{\frac{4477.3}{n} + 212.09}$$

$$= 14.56$$

$25.67 - 14.56 = 11.11$ **A**