

294. An insurer issues a number of identical special 1-year term life insurance policies.

Each policy has a death benefit of 1000 payable at the end of the year of death, on condition that:

- (i) The policyholder dies during the year; and
- (ii) A stock index ends the year below its value at the start of the year.

Both conditions must be satisfied for the death benefit to be paid.

You are given:

- (i) Future lifetimes of the policyholders are independent
- (ii) $q_x = 0.05$ for all x .
- (iii) The probability that the stock index ends the year below its value at the start of the year is 0.1 for all years.
- (iv) Future lifetimes of the policyholders and the value of the stock index are independent.
- (v) The annual effective rate of interest rate is 3%.

X_{10} denotes the total of the present value of benefits at issue for 10 policies.

X_N denotes the total present value of benefits for N policies.

Calculate $\frac{\sqrt{\text{Var}(X_{10})}}{10} - \lim_{N \rightarrow \infty} \frac{\sqrt{\text{Var}(X_N)}}{N}$.

- (A) 11.1
- (B) 16.3
- (C) 21.2
- (D) 25.7
- (E) 31.4