

MLC Question 102

Calculate $1000 P_{x+20}$

Here is how we solve the problem -

$$1000 P_{x+20} = \frac{\text{APV (Benefits)}}{\text{APV (Premiums)}} = \frac{1000 A_{x+20}}{\ddot{a}_{x+20}}$$

Find \ddot{a}_{x+20}

Recursive reserve formula

$$(1+i) (1000 {}^{20}_{19}V_x + \pi_{19}) = q_{x+19} b_{20} + p_{x+19} 1000 {}^{20}_{20}V_x$$

$$(1.06) (342.03 + 13.72) = 0.01254(1000) + 0.98746 (1000 {}^{20}_{20}V_x)$$

↙ 20 payment insurance

$$1000 {}^{20}_{20}V_x = 369.18 = 1000 A_{x+20}$$

because there are only 20 payments,

last payment is π_{19} in the 20th year

no remaining premium

this reserve is equal to the APV insurance at the end of yr 20

$$A_{x+20} = 0.36918$$

$$\ddot{a}_{x+20} = \frac{1 - A_{x+20}}{d} = \frac{1 - 0.36918}{\left(\frac{0.06}{1.06}\right)} = 11.1445$$

annuity due

APV insurance at the end of yr 20

Therefore,

$$1000 P_{x+20} = \frac{1000 A_{x+20}}{\ddot{a}_{x+20}} = \frac{369.18}{11.1445} = 33.1 \text{ (D)}$$

Reserves

