

Benefit Premium - solutions

22.28.

$$A_{20:\overline{3}|}^1 = \frac{1}{60} \sum_{k=1}^3 \frac{1}{1.05^k} = 0.045387$$

$$A_{20:\overline{3}|} = 0.045387 + \left(\frac{57}{60}\right)\left(\frac{1}{1.05^3}\right) = 0.866033$$

$$\ddot{a}_{20:\overline{3}|} = \frac{1 - 0.866033}{0.05/1.05} = 2.813303$$

$$P_{20:\overline{3}|}^1 = \frac{0.045387}{2.813303} = 0.0161332$$

The answer is $\$100,000(0.0161332) = \$1,613.32$. (D)

22.32. Let P be the net annual premium. The equation for P is

$$P\ddot{a}_{30:\overline{10}|} = 1000A_{30} + P[(IA)_{30:\overline{10}|}^1 + 10 \cdot {}_{10|}A_{30}]$$

Solving for P immediately results in (E).

22.35. As is traditional on exams, the last question (#40) is an easy one. All the data you need is given pretty clearly.

The present value of the premium annuity is 7.747π . The basic death benefit's (not including refund of premium) present value is $1000A_{30} = 102$. The refund of premium is an increasing insurance for 10 years, and then levels off as an insurance of 10π afterwards, so its value is $\pi[(IA)_{30:\overline{10}|}^1 + 10 \cdot {}_{10|}A_{30}] = \pi(0.078 + 0.88) = 0.958\pi$. Equating the premiums and benefits:

$$7.747\pi = 102 + 0.958\pi$$

$$\pi = \frac{102}{6.789} = \boxed{15.0243} \quad (\text{B})$$