

MATH 3630 - Actuarial Mathematics I
 Fall 2009 - Valdez
 Homework No. 4
 due Monday, 6:50 PM, 16 November 2009

Please return this page with your signature. Please write your name and student number at the spaces provided:

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A special whole life annuity-immediate is issued to age 35 with the following decreasing scale of benefit payments:

age	payments
35-45	20
45-60	15
60 & later	10

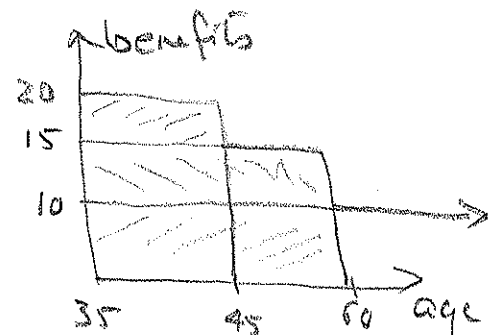
Assume the benefits are payable annually and that:

- mortality follows the Illustrative Life Table; and
- $i = 6\%$.

Calculate the actuarial present value of these annuity payments. (Your answer must be a number!)

Because table gives life annuity-due values, may be better to view the payments at age 36 and then discount with life to age 35. In effect, we have

$$APV(\text{annuity}) = {}_1E_{35} \left(10 \ddot{a}_{36} + 5 \ddot{a}_{36:\overline{25}|} + 5 \ddot{a}_{36:\overline{10}|} \right)$$



$$\ddot{a}_{36} = 15.2870 \quad (\text{directly from table})$$

$$\ddot{a}_{36:\overline{25}|} = \ddot{a}_{36} - \underbrace{25E_{36}}_{5E_{36} \quad 20E_{41}} \ddot{a}_{61}$$

$$= 15.2870 - \left(\frac{738.16}{1000} \right) \left(\frac{271.12}{1000} \right) (10.9041) = 13.10476$$

$$\ddot{a}_{36:\overline{10}|} = \ddot{a}_{36} - 10E_{36} \ddot{a}_{46}$$

$$= 15.2870 - \left(\frac{542.11}{1000} \right) (13.9546) = 7.722072$$

Thus,

$$\text{APV}(\text{annuity}) = \sqrt[1]{1.06} P_{35} \left(\underbrace{10(15.2870) + 5(13.10476) + 5(7.722072)}_{257.0042} \right)$$

$$= \underline{\underline{241.9694}}$$