

STAT 475
Spring 2019
Quiz 2
March 7, 2019

1. Gavin (50) and David (60) purchase a last survivor life insurance policy. The death benefit of 1,000,000 is paid at the end of the year of the second death. Premiums are annually as long as at least one of Gavin and David is alive.

You are given that mortality follows the Standard Ultimate Life Table and that the annual effective interest is at 5%.

Calculate the net annual premium for this policy.

Solution:

$$PVP = PVB$$

$$P\ddot{a}_{50:60} = (1,000,000)A_{50:60}$$

$$P(\ddot{a}_{50} + \ddot{a}_{60} - \ddot{a}_{50:60}) = (1,000,000)(A_{50} + A_{60} - A_{50:60})$$

$$P = \frac{(1,000,000)(0.18931 + 0.29028 - 0.32048)}{17.0245 + 14.99041 - 14.2699} = 9010.29$$

2. Zhaorui (55) and Jillian (45) are receiving a last survivor annuity benefit. The benefit pays 10,000 at the beginning of each year if both are alive. It pays 4000 at the beginning of each year if Zhaorui is alive and Jillian is dead. It pays 5000 at the beginning of each year if Jillian is alive and Zhaorui is dead.

Using the Standard Ultimate Life Table and an annual effective interest rate of 5%, calculate the present value of this annuity.

Solution:

Assuming that all payments are annual as the emailed correction indicated:

$$PV = 4000\ddot{a}_{55} + 5000\ddot{a}_{45} + 1000\ddot{a}_{45:55}$$

$$= (4000)(16.0599) + (5000)(17.8162) + (1000)(15.5109) = 168,831.50$$

If the year above highlighted in yellow as monthly as originally written, then:

$$PV = (12,000)(12)\ddot{a}_{45:55}^{(12)} + 4000\ddot{a}_{55} + 5000\ddot{a}_{45} - 9000\ddot{a}_{45:55}$$

$$(120,000)[\alpha(12)\ddot{a}_{45:55} - \beta(12)] + 4000\ddot{a}_{55} + 5000\ddot{a}_{45} - 9000\ddot{a}_{45:55}$$

$$= (120,000)[(1.00020)(15.5109) - 0.46651] + (4000)(16.0599) + (5000)(17.8162) - (9000)(15.5109)$$

$$= 1,819,421.56$$