

Chapter 5 – Past Test and Quiz Problems – Portfolio of Policies

Diego is (65) and is the recipient of an annuity that pays 5000 at the beginning of each year for the rest of his life.

You are given that mortality follows the Standard Ultimate Life Table with interest at 5%.

Let Y be the present value random variable for Diego's annuity.

- a. (1 point) Calculate the $E[Y]$.

Solution:

$$E[Y] = 5000\ddot{a}_{65} = (5000)(13.5498) = 67,749$$

- b. (3 points) Calculate the $Var[Y]$.

Solution:

$$Var[Y] = (5000)^2 \left[\frac{{}^2A_{65} - (A_{65})^2}{d^2} \right] = (5000)^2 \left[\frac{0.15420 - (0.35477)^2}{(0.05/1.05)^2} \right] = 312,429,174$$

Lin Life Insurance Company has sold 625 annuities identical to Diego's annuity to 625 independent lives.

- c. (3 points) Calculate the 90% confidence interval for the present value of this annuity portfolio using the normal distribution.

Solution:

$$E[Port] = 625(67,749) = 42,343,125$$

$$\sqrt{Var[Port]} = \sqrt{(625)(312,429,174)} = 441,891.65$$

$$CI = 42,343,125 \pm (1.645)(441,891.65)$$

$$(41,616,213 ; 43,070,037)$$