

Module 2 Section 3 Exercises:

Note that the same relationships among the different insurances (whole life, n -year deferred, n -year term, endowment) in the discrete case in section 2 hold in the continuous case in this section. You can review those relationships by looking over Section 2 problems, and so there won't be as many exercises in this section. You'll see more problems in the end of module quizzes.

1. Given $\bar{A}_x = 0.5$, $\bar{A}_{x+n} = 0.6$, and ${}_nE_x = 0.55$, determine $\bar{A}_{x:\overline{n}|}$.

For Numbers 2 through 4, draw an appropriate timeline for the insurance described and determine an expression for the present value random variable, Z . Then determine the EPV and the variance of Z , using the following actuarial assumption:

- (a) DML(100) and $\delta = .05$ actuarial assumptions
 - (b) CF with $\mu = .03$ and $\delta = .05$ actuarial assumptions
- (Note that ages matter for part (a), but not for part (b).)

2. a whole life insurance of 5000, issued to (60), payable at the moment of death
3. a continuous 20-year deferred whole life insurance of 1000 issue to a 60 year old
4. a 20-year endowment insurance of 3000 issued to (60), with death benefit paid at the moment of death
5. Determine an expression using single life and joint life statuses for the actuarial present value of a continuous insurance, based on independent lives (x) and (y), with death benefit as follows:
 - if (x) dies first, 5 is paid when (x) dies and 20 is paid when (y) dies
 - if (y) dies first, 10 is paid when (x) dies and 15 is paid when (y) dies
6. A 10-year term insurance of 100,000 issued to (x), with benefit payable at the moment of death, has a double indemnity clause stating that an additional 50,000 will be paid if death occurs by accidental means. Given $\mu_x^{(\text{accident})} = .005$, $\mu_x^{(\text{non-accident})} = .02$ and $\delta = .05$, determine the EPV of the insurance.

For Numbers 7 and 8, determine the EPV of the insurance described, using

- (a) ILT actuarial assumptions and the UDD assumption between integer ages
 - (b) ILT actuarial assumptions and the claims acceleration approach
7. A whole life insurance issued to (40) with a benefit of 1000 payable at the moment of death
 8. A 20-year endowment insurance issued to (40) with a benefit of 1000 payable at the moment of death