

Each problem is worth 10 points. Show all work for full credit, and use correct notation.

Determine the variance of the random variable representing the present value of the benefit of the insurance or annuity product described.

1. a whole life insurance of 1000, payable at the end of the year of death, issued to (50), using ILT assumptions
2. a discrete 2-year endowment insurance of 2000 issued to (35) using $DML(\omega = 95)$ mortality and $i = 5\%$
3. a 20-year deferred whole life insurance of 3000, payable at the end of the quarter of death, issued to (30), using ILT assumptions and the claims acceleration approach
4. a 20-year endowment insurance of 4000, payable at the moment of death, issued to (30) using ILT assumptions and assuming a uniform distribution of deaths between integer ages
5. an insurance issued to (30) that pays 5000 at the end of the year of death if death occurs between ages 40 and 50, using ILT assumptions
6. a discrete 10-year endowment insurance of 6000 issued on the last survivor status on independent lives, both age 40 (i.e, the death benefit is payable at the end of the year of the last death, if within 10 years, and the pure endowment is paid at the end of 10 years, if at least one of the 40-year olds survives), using ILT assumptions
7. a whole life annuity issued to (x) that pays continuously at a annual rate of 100 per year, using $CF(\mu = 0.02, \delta = 0.03)$ assumptions.
8. a 2-year temporary life annuity due issued to (45) with semiannual payments of 2000, using $DML(\omega = 95)$ mortality and $d = 19\%$
9. a 10-year temporary life annuity due issued to (30) with monthly payments of 300, using ILT assumptions and assuming a uniform distribution of deaths between integer ages.
10. a discrete annuity due issued to independent lives, ages 40 and 30, that pays 400 per year while both are alive, using ILT assumptions