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The pricing tool combines single life product and the feature product. There are two group of policyholders x and y with different mortality. For single product, the user can choose group x or group y. There are also options for premium payment (single or level), insurance benefit (pure endownment, term assurance or endownment assurance) or the insurance payment benefit (pay immediately on death or pay at the end of year of death). The users can also enter the interest rate, the initial expense, the claim expense, and the premium expense.

The feature product is the funeral for the beloved (y). The benefit payment will be made at the end of the year of y death, given that x still alive at that time. The users can choose the age of x and y, the sum assured, the interest rate, the initial expense, and the claim expense. By this tool, the users can compare the price between the life insurance product for independent single life and a specific insurance product for group x and y.

Insurance Benefit Valuation Tool - **Funeral for the beloved (y)**

Funeral for the beloved (y)

Question 1:

Because the benefit payment will be made at the end of the year y die provided x is alive at the end of this year. The EPV of this product require using the random variable of the curtate lifetime. Hence, the expected present value of the feature product is the sum of all expected present value in each year.

Question 2:

The probability y live t-1 year and die in the next year is ${}_{t-1|}q_y$

The probability x live t year is ${}_tp_x$

At given time t, the probability that a payment will be made is ${}_{t-1|}q_y \times {}_tp_x = \frac{l_{y+t+1} - l_{y+t}}{l_{y+t}} \times \frac{l_{x+t}}{l_x}$

Question 3:

The expression for the EPV of the benefits using summations is

EPV = ${}_{0|}q_y \times {}_0p_x \times v^1 + {}_{1|}q_y \times {}_2p_x \times v^2 + {}_{2|}q_y \times {}_3p_x \times v^3 + \ldots = \sum_{t=1}^{n} v^t \, {}_{t-1|}q_y \times {}_tp_x$