Discount factor

$$v = \frac{1}{1+i}$$

Commutative numbers

$$p_x = 1 - q_x$$

$$l_{x+1} = l_x * p_x$$

$$d_x = l_x - l_{x+1}$$

$$D_x = l_x v^x$$

$$C_x = d_x v^{x+1}$$

$$N_x = D_x + D_{x+1} + \cdots + D_w$$

$$M_x = C_x + C_{x+1} + \cdots + C_{w-1}$$

Net Single Premium

$$_{|n}E_x = \frac{D_{x+n}}{D_x}$$

- x is age of insured person
- n is contract duration

$$_{|n}A_x = \frac{M_x - M_{x+n}}{D_x}$$

$$Net\ Single\ Premium = \begin{cases} {}_{|n}E_x * Sum\ Insured \quad for\ Saving \\ {}_{|n}A_x * Sum\ Insured \quad for\ Death \\ ({}_{|n}E_x + {}_{|n}A_x) * Sum\ Insured \quad for\ Endowment \end{cases}$$

Net Annual Premium– Annuity factor

$$_{|t}a_x = \frac{N_x - N_{x+t}}{D_x}$$

- x is age of insured person
- t is time period

$$NetAnnualPremium = \frac{NetSinglePremium}{_{|m}a_x}$$

- m is premium payment duration

Annuity factor with adjustment

$$_{|t}a_x{}^{(j)} = {}_{|t}a_x - \frac{j-1}{2*j}$$

- x is age of insured person
- t is time period
- j is premium payment frequency

$$NetPremiumWithinTheYear = \frac{NetSinglePremium}{_{|m}a_x{}^{(j)} * j}$$

- m is premium payment duration
- j is premium payment frequency

$$Gross\ Single\ Premium = \begin{cases} \frac{{}_{|n}E_x + \alpha + \gamma * {}_{|n}a_x}{1-\beta} * Sum\ Insured \quad for\ Saving \\ \frac{{}_{|n}A_x + \alpha + \gamma * {}_{|n}a_x}{1-\beta} * Sum\ Insured \quad for\ Death \\ \frac{({}_{|n}E_x + {}_{|n}A_x) + \alpha + \gamma * {}_{|n}a_x}{1-\beta} * Sum\ Insured \quad for\ Endowment \end{cases}$$

$$GrossAnnualPremium = \frac{GrossSinglePremium}{{}_{|m}a_x}$$

$$GrossPremiumWithinTheYear = \frac{GrossSinglePremium}{{}_{|m}a_x^{(j)} * j}$$

(gross-premium-interface "endownment" 23 10 3 4 100000 "male")