Random Variables

Whole Life insurance with Death Benefit of 1 paid at the moment of death of (x)

$$Z = v^{T_x}$$

Whole Life insurance with Death Benefit of 1 paid at the end of the year of death of (x)

$$Z = v^{K_x+1}$$

n year Term Life insurance with Death Benefit of 1 paid at the moment of death of (x)

$$Z = v^{T_x} \quad \text{for } 0 \le T_x < n \qquad \text{and} \qquad 0 \quad \text{for } T_x \ge n$$

n year Term Life insurance with Death Benefit of 1 paid at the end of the year of death of (x)

$$Z = v^{K_x+1} \quad \text{for } 0 \le K_x \le n-1 \qquad \text{and} \qquad 0 \quad \text{for } \mathrm{K}_x \ge n$$

n year Pure Endowment with an endowment of 1 paid at time n if (x) is alive

$$Z = 0 \quad \text{for } 0 \le T_x < n \qquad \text{and} \qquad v^n \quad \text{for } \mathrm{T}_x \ge n$$

n year Endowment insurance with Death Benefit of 1 paid at the moment of death of (x)

$$Z = v^{T_x} \quad \text{for } 0 \le T_x < n \qquad \text{and} \qquad v^n \quad \text{for } T_x \ge n$$

Or

$$Z = v^{\min\{T_x, n\}}$$

n year Endowment insurance with Death Benefit of 1 paid at the end of the year of death of (x)

$$Z = v^{K_x+1} \quad \text{for } 0 \le K_x \le n-1 \qquad \text{and} \qquad v^n \quad \text{for } \mathrm{K}_x \ge n$$

Or

$$Z = v^{\min\{K_x+1, n\}}$$

Whole Life Annuity due with annual payments of 1

$$Y = \ddot{a}_{\overline{K_x+1}|} = \frac{1-v^{K_x+1}}{d}$$

Whole Life Annuity with continuous payments at a rate of 1 per year

$$Y = \bar{a}_{\overline{T_x}|} = \frac{1-v^{T_x}}{\delta}$$

n year term Life Annuity due with annual payments of 1

$$Y = \ddot{a}_{\overline{K_x+1}|} = \frac{1-v^{K_x+1}}{d} \quad \text{for } K_x = 0,1,\ldots,n-1 \qquad \text{and} \qquad Y = \ddot{a}_{\overline{n}|} = \frac{1-v^{n}}{d} \quad \text{for } K_x \geq n$$

Or

$$Y = \ddot{a}_{\overline{\min(K_x+1,n)}|} = \frac{1-v^{\min(K_x+1,n)}}{d}$$

n year Life Annuity with continuous payments at a rate of 1 per year

$$Y = \bar{a}_{\overline{T_x}|} = \frac{1-v^{T_x}}{\delta} \quad \text{for } 0 \leq T_x < n \qquad \text{and} \qquad Y = \bar{a}_{\overline{n}|} = \frac{1-v^{n}}{\delta} \quad \text{for } T_x \geq n$$

Or

$$Y = \bar{a}_{\overline{\min(T_x,n)}|} = \frac{1-v^{\min(T_x,n)}}{\delta}$$

Whole Life Annuity due with mthly payments of 1/m

$$Y = \ddot{a}^{(m)}_{\overline{K_x^{(m)}+1/m}|} = \frac{1-v^{K_x^{(m)}+1/m}}{d^{(m)}} \quad \text{for } K_x < 0,1,\ldots,n \qquad \text{and} \qquad Y = \ddot{a}^{(m)}_{\overline{n}|} = \frac{1-v^{n}}{d^{(m)}} \quad \text{for } K_x \geq n$$

Or

$$Y = \ddot{a}^{(m)}_{\overline{\min(K_x^{(m)}+1,n)}|} = \frac{1-v^{\min(K_x^{(m)}+1/m,n)}}{d^{(m)}}$$