Formula Page – Test 1 – Actuarial Science 2053

Simple Interest

$S = P(1+rt)$ $P = S(1+rt)^{-1}$ $I = Prt = S - P$

Simple Discount

$S = P(1-dt)^{-1}$ $P = S(1-dt)$ $D = Sdt = S - P$

Compound Interest

$S = P(1+i)^{n}$ $P = S(1+i)^{-n}$ $i = j_m / m$

Equivalent Rates

j_m and j_p are equivalent if $(1+\frac{j_m}{m})^{m} = (1+\frac{j_p}{p})^{p}$

Fractional Periods

- Exact (theoretical) method uses compound interest for the fractional part of an interest period
- Approximate (practical) method uses simple interest for the fractional part of an interest period

Simple Annuities

Ordinary Annuity

$S = R\ s_{\overline{n}|i} = R\,[\frac{(1+i)^{n}-1}{i}]$ (focal date = time of n^{th} payment)

$A = R\ a_{\overline{n}|i} = R\,[\frac{1-(1+i)^{-n}}{i}]$ (focal date = one period before first payment)

Annuity Due

$S = R\ \ddot{s}_{\overline{n}|i} = R\ s_{\overline{n}|i}\,(1+i) = R\,[s_{\overline{n+1}|i} - 1]$ (focal date = one period after n^{th} payment)

$A = R\ \ddot{a}_{\overline{n}|i} = R\ a_{\overline{n}|i}\,(1+i) = R\,[1 + a_{\overline{n-1}|i}]$ (focal date = time of first payment)

Deferred Annuity

$A = R\ a_{\overline{n}|i}\,(1+i)^{-k}$

Forborne Annuity

$S = R\ s_{\overline{n}|i}\,(1+i)^{m}$