Exam 1 Information

You are encouraged to check this document to make sure that I did not accidently have typos in any of the formulas.

Chapter 1

- $a(t)$: accumulation function. measures the amount in a fund with an investment of 1 at time 0 at the end of t years.

  $a(t) = 1 + it$ simple interest

  $a(t) = (1+i)^t$ compound interest

  $a(t) = \prod_{j=1}^{t}(1+i_j)$ varying interest rates where i_j is the rate per period.

- $A(t) = ka(t)$: amount function where k is usually the initial amount invested and will give the value of the fund at time t.

- $I_n = A(n) - A(n-1)$ interest earned during the n-th period

- Interest rates

  i - effective rate of interest

  $i_n = \frac{A(n)-A(n-1)}{A(n-1)}$ the effective rate of interest of the n-th period

  $i^{(m)}$ nominal rate of interest compounded m-thly

  $\frac{i^{(m)}}{m}$ effective rate of interest per period (m periods in a year)

- discount rates

  d - effective rate of discount

  $d_n = \frac{A(n)-A(n-1)}{A(n)}$ the effective rate of discount of the n-th period

  $d^{(m)}$ is nominal rate of discount coumpounded m-thly

  $\frac{d^{(m)}}{m}$ effective rate of discount per period (m periods in a year)

- present value (discounting)

  PV $= \frac{1}{a(t)}$

  simple interest $(1+it)^{-1}$

  compound interest $(1+i)^{-t} = v^t$

  simple discount: $a(t) = 1 - dt$

  compound discount: $a(t) = (1-d)^t = v^t$

- force of interest

  $$\delta_t = \frac{A'(t)}{A(t)} = \frac{a'(t)}{a(t)}$$

  $$\delta_t = \frac{d}{dt}\ln(A(t)) = \frac{d}{dt}\ln(a(t))$$

  $$a(t) = e^{\int_0^t \delta_r dr}$$

  $$A(t) = A(0)e^{\int_0^t \delta_r dr}$$

  $$A(t2) = A(t1)e^{\int_{t1}^{t2} \delta_r dr}$$

- if force of interest constant

  $a(t) = e^{\delta t}$

  present value $= e^{-\delta t}$

  $\delta = \ln(1+i)$

  $1 + i = e^{\delta}$

- useful formulas/relationships

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

  $$1 - d = v$$

  $$d = \frac{i}{1+i} = iv$$

  $$i = \frac{d}{1-d}$$

  $$1 + i = \left(1 + \frac{i^{(m)}}{m}\right)^m$$

  $$1 - d = \left(1 - \frac{d^{(m)}}{m}\right)^m$$

  $$1 + i = (1-d)^{-1}$$

Chapter 2

- Equations of value
- method of equated time
- solving problems for unknown time
- solving problems for unknown interest rates
- determing time periods
  usually used with simple interest or compounded daily

  exact: actual/actual

  ordinary: 30/360

  banker's rule: actual/360

Any additional topic/infomation covered in these chapters.