Notation and terminology used for Exam FM/2

The following notation and terminology will apply to the examination questions.

Unless otherwise stated in the examination question, rates are expressed as annual rates. For example, the rate of interest, the rate of discount, the force of interest, the yield rate, and the coupon rate.

The effective rate of interest is denoted by i. The nominal rate of interest payable m times per period is denoted by $i^{(m)}$.

When more than one interest rate is referenced in a question, additional letters such as j may be used to denote the additional interest rates.

The effective rate of discount is denoted by d and is equal to $\frac{i}{1+i}$. . The nominal rate of discount payable m times per period is denoted by $d^{(m)}$.

The discount factor is denoted by v and is equal to $\frac{1}{1+i}$.

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Force of interest:

A constant force of interest is denoted by δ

A force of interest varying by time is denoted by δ_t

An annuity-immediate is an annuity where the payments are made at the end of each period.

The present value of an annuity-immediate with n payments of 1, at interest rate i, is denoted by

$a_{\overline{n}|}$ or $a_{\overline{n}|i}$

The accumulated value of an annuity-immediate with n payments of 1, at interest rate i, is denoted by

$s_{\overline{n}|}$ or $s_{\overline{n}|i}$

An annuity-due is an annuity where the payments are made at the beginning of each period.

The present value of an annuity-due with n payments of 1, at interest rate i, is denoted by

$\ddot{a}_{\overline{n}|}$ or $\ddot{a}_{\overline{n}|i}$

The accumulated value of an annuity-due with n payments of 1, at interest rate i, is denoted by

$$\ddot{s}_{\overline{n}|} \text{ or } \ddot{s}_{\overline{n}|i}$$

"Dollar-weighted rate of return" means the simple interest approximation to the yield rate.

Unless otherwise stated in the examination question, the redemption value of a bond at the maturity date of the bond is equal to the face amount (par value) of the bond.

If the purchase price of a bond is greater than its redemption value, then the bond is said to be sold at a premium and the difference between the purchase price and the redemption value is called the "premium".

If the purchase price of a bond is less than its redemption value, then the bond is to be sold at a discount and the difference between the redemption value and the purchase price is called the "discount".

Unless otherwise stated in the examination question, "duration" means Macaulay duration and "convexity" means modified convexity.

Modified duration = $-\frac{P'(i)}{P(i)}$ and

Modified convexity = $\frac{P''(i)}{P(i)}$ where $P(i)=\sum_{t=1}^{N}\left(R_t\left(1+i\right)^{-t}\right)$ and R_t is the cash flow at time t.

Macaulay duration = $\frac{\sum_{t=1}^{N} t\left(R_t e^{-\delta t}\right)}{\sum_{t=1}^{N}\left(R_t e^{-\delta t}\right)}$ where δ is the continuously compounded rate of interest or the force of interest.

Macaulay convexity = $\frac{\sum_{t=1}^{N} t^2\left(R_t e^{-\delta t}\right)}{\sum_{t=1}^{N}\left(R_t e^{-\delta t}\right)}$.