Example (Exam FM Sample Question 21)

Payments are made to an account at a continuous rate of $(8k + tk)$, where $0 \leq t \leq 10$. Interest is credited at a force of interest $\delta_t = \frac{1}{8+t}$. After time 10, the account is worth 20,000. Calculate k.

(A) 111 (B) 116 (C) 121 (D) 126 (E) 131

Example (Exam FM Sample Question 22)

You have decided to invest in Bond X, an n-year bond with semi-annual coupons and the following characteristics:

(i) Par value is 1000.

(ii) The ratio of the semi-annual coupon rate r, to the desired semi-annual yield rate i, is 1.03125.

(iii) The present value of the redemption value is 381.50.

Given $(1+i)^{-n} = 0.5889$, calculate the price of bond X.

(A) 1019 (B) 1029 (C) 1050 (D) 1055 (E) 1072

Example (Exam FM Sample Question 23)

Project P requires an investment of 4000 today. The investment pays 2000 one year from today and 4000 two years from today. Project Q requires an investment of X two years from today. The investment pays 2000 today and 4000 one year from today. The net present values of the two projects are equal at an annual effective interest rate of 10%. Calculate X.

(A) 5400 (B) 5420 (C) 5440 (D) 5460 (E) 5480

Example (Exam FM Sample Question 25)

A perpetuity-immediate pays X per year. Brian receives the first n payments, Colleen receives the next n payments, and a charity receives the remaining payments. Brian's share of the present value of the original perpetuity is 40%, and the charity's share is K. Calculate K .

(A) 24% (B) 28% (C) 32% (D) 36% (E) 40%

Example (Exam FM Sample Question 26)

Seth, Janice, and Lori each borrow 5000 for five years at an annual nominal interest rate of 12%, compounded semi-annually. Seth has interest accumulated over the five years and pays all the interest and principal in a lump sum at the end of five years. Janice pays interest at the end of every six-month period as it accrues and the principal at the end of five years. Lori repays her loan with 10 level payments at the end of every six-month period. Calculate the total amount of interest paid on all three loans.

(A) 8718 (B) 8728 (C) 8738 (D) 8748 (E) 8758

Example (Exam FM Sample Question 27)

Bruce and Robbie each open up new bank accounts at time 0. Bruce deposits 100 into his bank account, and Robbie deposits 50 into his. Each account earns the same annual effective interest rate. The amount of interest earned in Bruce's account during the 11th year is equal to X. The amount of interest earned in Robbie's account during the 17th year is also equal to X. Calculate X.

(A) 28.00 (B) 31.30 (C) 34.60 (D) 36.70 (E) 38.90

Example (Exam FM Sample Question 28)

Ron is repaying a loan with payments of 1 at the end of each year for n years. The annual effective interest rate on the loan is i. The amount of interest paid in year t plus the amount of principal repaid in year $t+1$ equals X. Determine which of the following is equal to X.

(A) $1+\frac{v^{n-t}}{i}$ (B) $1+\frac{v^{n-t}}{d}$ (C) $1+v^{n-t}i$

(D) $1+v^{n-t}d$ (E) $1+v^{n-t}$

Example (Exam FM Sample Question 29)

At an annual effective interest rate of i, $i > 0\%$, the present value of a perpetuity paying 10 at the end of each 3-year period, with the first payment at the end of year 3, is 32. At the same annual effective rate of i, the present value of a perpetuity paying 1 at the end of each 4-month period, with first payment at the end of 4 months, is X. Calculate X.

(A) 31.6 (B) 32.6 (C) 33.6 (D) 34.6 (E) 35.6

Example (Exam FM Sample Question 30)

As of 12/31/2013, an insurance company has a known obligation to pay 1,000,000 on 12/31/2017. To fund this liability, the company immediately purchases 4-year 5% annual coupon bonds totaling 822,703 of par value. The company anticipates reinvestment interest rates to remain constant at 5% through 12/31/2017. The maturity value of the bond equals the par value. Consider two reinvestment interest rate movement scenarios effective 1/1/2014. Scenario A has interest rates drop by 0.5%. Scenario B has interest rates increase by 0.5%. Determine which of the following best describes the insurance company's profit or (loss) as of 12/31/2017 after the liability is paid.

(A) Scenario A: 6,610, Scenario B: 11,150
(B) Scenario A: (14,760), Scenario B: 14,420
(C) Scenario A: (18,910), Scenario B: 19,190
(D) Scenario A: (1,310), Scenario B: 1,320
(E) Scenario A: 0, Scenario B: 0

Example (Exam FM Sample Question 31)

An insurance company has an obligation to pay the medical costs for a claimant. Annual claim costs today are 5000, and medical inflation is expected to be 7% per year. The claimant will receive 20 payments. Claim payments are made at yearly intervals, with the first claim payment to be made one year from today. Calculate the present value of the obligation using an annual effective interest rate of 5%.

(A) 87,900 (B) 102,500 (C) 114,600 (D) 122,600
(E) Cannot be determined

Example (Exam FM Sample Question 32)

An investor pays 100,000 today for a 4-year investment that returns cash flows of 60,000 at the end of each of years 3 and 4. The cash flows can be reinvested at 4.0% per annum effective. Using an annual effective interest rate of 5.0%, calculate the net present value of this investment today.

(A) -1398 (B) -699 (C) 699 (D) 1398 (E) 2,629

Example (Exam FM Sample Question 33)

You are given the following information with respect to a bond:

(i) par value: 1000

(ii) term to maturity: 3 years

(iii) annual coupon rate: 6% payable annually

You are also given that the one, two, and three year annual spot interest rates are 7%, 8%, and 9% respectively. Calculate the value of the bond.

(A) 906 (B) 926 (C) 930 (D) 950 (E) 1000

Example (Exam FM Sample Question 34)

You are given the following information with respect to a bond:

(i) par value: 1000

(ii) term to maturity: 3 years

(iii) annual coupon rate: 6% payable annually

You are also given that the one, two, and three year annual spot interest rates are 7%, 8%, and 9% respectively. The bond is sold at a price equal to its value. Calculate the annual effective yield rate for the bond i. (A) 8.1 (B) 8.3 (C) 8.5 (D) 8.7 (E) 8.9

Example (Exam FM Sample Question 35)

The current price of an annual coupon bond is 100. The yield to maturity is an annual effective rate of 8%. The derivative of the price of the bond with respect to the yield to maturity is -700. Using the bond's yield rate, calculate the Macaulay duration of the bond in years.

(A) 7.00 (B) 7.49 (C) 7.56 (D) 7.69 (E) 8.00

Example (Exam FM Sample Question 36)

A common stock pays a constant dividend at the end of each year into perpetuity. Using an annual effective interest rate of 10%, calculate the Macaulay duration of the stock.

(A) 7 years (B) 9 years (C) 11 years (D) 19 years (E) 27 years

Example (Exam FM Sample Question 37)

A common stock pays dividends at the end of each year into perpetuity. Assume that the dividend increases by 2% each year. Using an annual effective interest rate of 5%, calculate the Macaulay duration of the stock in years

(A) 27 (B) 35 (C) 44 (D) 52 (E) 58