

Example (Exam FM Sample Question 1)

Bruce deposits 100 into a bank account. His account is credited interest at an annual nominal rate of interest of 4% convertible semiannually. At the same time, Peter deposits 100 into a separate account. Peter's account is credited interest at an annual force of interest of δ .

After 7.25 years, the value of each account is the same. Calculate δ .

- (A) 0.0388 (B) 0.0392 (C) 0.0396 (D) 0.0404 (E) 0.0414

Example (Exam FM Sample Question 2)

Kathryn deposits 100 into an account at the beginning of each 4-year period for 40 years. The account credits interest at an annual effective interest rate of i . The accumulated amount in the account at the end of 40 years is X , which is 5 times the accumulated amount in the account at the end of 20 years.

Calculate X .

- (A) 4695 (B) 5070 (C) 5445 (D) 5820 (E) 6195

Example (Exam FM Sample Question 3)

Eric deposits 100 into a savings account at time 0, which pays interest at an annual nominal rate of i , compounded semiannually. Mike deposits 200 into a different savings account at time 0, which pays simple interest at an annual rate of i . Eric and Mike earn the same amount of interest during the last 6 months of the 8th year. Calculate i .

- (A) 9.06% (B) 9.26% (C) 9.46% (D) 9.66% (E) 9.86%

Example (Exam FM Sample Question 5)

An association had a fund balance of 75 on January 1 and 60 on December 31. At the end of every month during the year, the association deposited 10 from membership fees. There were withdrawals of 5 on February 28, 25 on June 30, 80 on October 15, and 35 on October 31. Calculate the dollar-weighted (money-weighted) rate of return for the year.

- (A) 9.0% (B) 9.5% (C) 10.0% (D) 10.5% (E) 11.0%

Example (Exam FM Sample Question 6)

A perpetuity costs 77.1 and makes end-of-year payments. The perpetuity pays 1 at the end of year 2, 2 at the end of year 3, ..., n at the end of year $(n+1)$. After year $(n+1)$, the payments remain constant at n . The annual effective interest rate is 10.5%. Calculate n .

- (A) 17 (B) 18 (C) 19 (D) 20 (E) 21

Example (Exam FM Sample Question 7)

1000 is deposited into Fund X, which earns an annual effective rate of 6%. At the end of each year, the interest earned plus an additional 100 is withdrawn from the fund. At the end of the tenth year, the fund is depleted. The annual withdrawals of interest and principal are deposited into Fund Y, which earns an annual effective rate of 9%. Calculate the accumulated value of Fund Y at the end of year 10.

- (A) 1519 (B) 1819 (C) 2085 (D) 2273 (E) 2431

Example (Exam FM Sample Question 9)

A 20-year loan of 1000 is repaid with payments at the end of each year. Each of the first ten payments equals 150% of the amount of interest due. Each of the last ten payments is X . The lender charges interest at an annual effective rate of 10%. Calculate X .

- (A) 32 (B) 57 (C) 70 (D) 97 (E) 117

Example (Exam FM Sample Question 10)

A 10,000 par value 10-year bond with 8% annual coupons is bought at a premium to yield an annual effective rate of 6%. Calculate the interest portion of the 7th coupon.

- (A) 632 (B) 642 (C) 651 (D) 660 (E) 667

Example (Exam FM Sample Question 11)

A perpetuity-immediate pays 100 per year. Immediately after the fifth payment, the perpetuity is exchanged for a 25-year annuity-immediate that will pay X at the end of the first year. Each subsequent annual payment will be 8% greater than the preceding payment. The annual effective rate of interest is 8%. Calculate X .

- (A) 54 (B) 64 (C) 74 (D) 84 (E) 94

Example (Exam FM Sample Question 12)

Jeff deposits 10 into a fund today and 20 fifteen years later. Interest for the first 10 years is credited at a nominal discount rate of d compounded quarterly, and thereafter at a nominal interest rate of 6% compounded semiannually. The accumulated balance in the fund at the end of 30 years is 100. Calculate d .

- (A) 4.33% (B) 4.43% (C) 4.53% (D) 4.63% (E) 4.73%

Example (Exam FM Sample Question 13)

Ernie makes deposits of 100 at time 0, and X at time 3. The fund grows at a force of interest

$$\delta_t = \frac{t^2}{100}, \quad t > 0.$$

The amount of interest earned from time 3 to time 6 is also X . Calculate X .

- (A) 385 (B) 485 (C) 585 (D) 685 (E) 785

Example (Exam FM Sample Question 14)

Mike buys a perpetuity-immediate with varying annual payments. During the first 5 years, the payment is constant and equal to 10. Beginning in year 6, the payments start to increase. For year 6 and all future years, the payment in that year is $K\%$ larger than the payment in the year immediately preceding that year, where $K < 9.2$. At an annual effective interest rate of 9.2% , the perpetuity has a present value of 167.50. Calculate K .

- (A) 4.0 (B) 4.2 (C) 4.4 (D) 4.6 (E) 4.8

Example (Exam FM Sample Question 15)

A 10-year loan of 2000 is to be repaid with payments at the end of each year. It can be repaid under the following two options:

- (i) Equal annual payments at an annual effective interest rate of 8.07%.
- (ii) Installments of 200 each year plus interest on the unpaid balance at an annual effective interest rate of i .

The sum of the payments under option (i) equals the sum of the payments under option (ii). Calculate i .

(A) 8.75% (B) 9.00% (C) 9.25% (D) 9.50% (E) 9.75%

Example (Exam FM Sample Question 16)

A loan is amortized over five years with monthly payments at an annual nominal interest rate of 9% compounded monthly. The first payment is 1000 and is to be paid one month from the date of the loan. Each succeeding monthly payment will be 2% lower than the prior payment. Calculate the outstanding loan balance immediately after the 40th payment is made.

- (A) 6750 (B) 6890 (C) 6940 (D) 7030 (E) 7340

Example (Exam FM Sample Question 17)

To accumulate 8000 at the end of $3n$ years, deposits of 98 are made at the end of each of the first n years and 196 at the end of each of the next $2n$ years. The annual effective rate of interest is i . You are given $(1 + i)^n = 2.0$. Calculate i .

- (A) 11.25% (B) 11.75% (C) 12.25%
(D) 12.75% (E) 13.25%

Example (Exam FM Sample Question 18)

Olga buys a 5-year increasing annuity for X . Olga will receive 2 at the end of the first month, 4 at the end of the second month, and for each month thereafter the payment increases by 2. The annual nominal interest rate is 9% convertible quarterly. Calculate X .

- (A) 2680 (B) 2730 (C) 2780 (D) 2830 (E) 2880

Example (Exam FM Sample Question 19)

You are given the following information about the activity in two different investment accounts:

Date	Fund value before activity	Deposit	Withdrawal
Account K			
1/1/2014	100.0		
7/1/2014	125.0		X
10/1/2014	110.0	2X	
12/31/2014	125.0		
Account L			
1/1/2014	100.0		
7/1/2014	125.0		X
12/31/2014	105.8		

During 2014, the dollar-weighted (money-weighted) return for investment account K equals the time-weighted return for investment account L, which equals i . Calculate i .

- (A) 10% (B) 12% (C) 15% (D) 18% (E) 20%

Example (Exam FM Sample Question 20)

David can receive one of the following two payment streams:

- (i) 100 at time 0, 200 at time n years, and 300 at time $2n$ years
- (ii) 600 at time 10 years

At an annual effective interest rate of i , the present values of the two streams are equal. Given $v^n = 0.76$, calculate i .

- (A) 3.5% (B) 4.0% (C) 4.5% (D) 5.0% (E) 5.5%