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| **Question**  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **BQ** | **Total** |
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**Choose the correct answers:**

**Q1:** At time 0, Eric deposits *X* into a bank account that credits interest at an annual effective rate of 7%.

At time 3, Mike deposits 1000 into a different bank account that credits simple interest at an annual rate of *y*%.

At time 5, the annual forces of interest on the two accounts are equal, and Mike’s account has accumulated to *Z*.

Calculate *Z*.

(A)  1160

(B)  1200

(C)  1390

(D)  1400

(E)  1510

**Q2:** You are given the following information with respect to a bond:

1. (i)  par value: 1000
2. (ii)  term to maturity: 3 years
3. (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%

**Q3:** John finances his daughter’s college education by making deposits into a fund earning interest at an annual effective rate of 8%. For 18 years he deposits *X* at the beginning of each month.
In the 16th through the 19th years, he makes a withdrawal of 25,000 at the beginning of each year.

The final withdrawal reduces the fund balance to zero.

Calculate *X.*

(A)  207

(B)  223

(C)  240

(D)  245

(E)  260

**Q4:** You invest payments of 1000 per year at the beginning of each year for 5 years.

The original payments earn 10% interest, but the interest received on the payment must be reinvested at 8%.

How much will you have at the end of year 5.

(A)  6670

(B)  8880

(C)  9090

(D)  10000

(E)  10600

**Q5:** 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. (Accumulated value of 5000)

Janice pays interest at the end of every six-month period as it accrues and the principal of 5000 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

**Q6:** A borrower takes out a 15-year loan for 400,000, with level end-of-month payments, at an annual nominal interest rate of 9% convertible monthly.

Immediately after the 36th payment, the borrower decides to refinance the loan at an annual nominal interest rate of *j*, convertible monthly. The remaining term of the loan is kept at twelve years, and level payments continue to be made at the end of the month. However, each payment is now 409.88 lower than each payment from the original loan.

Calculate *j.*

(A)  4.72%

(B)  5.75%

(C)  6.35 %

(D)  6.90%

(E)  9.14%

**Q7:** A borrower takes out a 50-year loan, to be repaid with payments at the end of each year. The loan payment is 2500 for each of the first 26 years. Thereafter, the payments decrease by 100 per year. Interest on the loan is charged at an annual effective rate of *i.*

The principal repaid in year 26 is *X*. (note:$P\_{t}=R\_{t}-iOB\_{t-1}$)

Determine the amount of interest paid in the first year.

(A) *Xv*25

(B) 2500*v*25 − *Xv*25

(C) 2500 – *X*

(D) 2500 − *XV* 25

 (E) 25*Xi*

**Q8:** An investor owns a bond that is redeemable for 300 in seven years. The investor has just received a coupon of 22.50 and each subsequent semiannual coupon will be *X* more than the preceding coupon. The present value of this bond immediately after the payment of the coupon is 1050.50 assuming an annual nominal yield rate of 6% convertible semiannually.

Calculate *X*.

(A)  7.54

(B)  10.04

(C)  22.37

(D)  34.49

(E)  43.98

**Q9:** A 1000-par value 30-year bond has an annual coupon rate of 7% paid semiannually. After an initial 10-year period of call protection, the bond is callable immediately following the payment of any of the 20th through the 59th coupons.

i)  If the bond is called before payment of the 40th coupon, the redemption value is 1250.

ii)  If the bond is called immediately after the payment of any of the 40th through the 59th coupons, the redemption value is 1125.

iii)  If the bond is not called, it will be redeemed at par.

To ensure that the bond will provide at least an annual nominal yield rate of 5% convertible semiannually, it must be assumed that the bond will be called or redeemed immediately after the payment of the *n*th coupon.

Calculate *n*.

(A)  20

(B)  39

(C)  40

(D)  59

(E)  60

**Q10:** You are given the following information about a 20-year bond with face amount 7500:

1. i)  The bond has an annual coupon rate of 7.4% paid semiannually.
2. ii)  The purchase price results in an annual nominal yield rate to the investor of 5.3% convertible semiannually.
3. iii)  The amount for amortization of premium in the fourth coupon payment is 28.31.

Calculate the redemption value of the bond.

(A)  7660

(B)  7733

(C)  7795

(D)  7879

(E)  7953

**BQ:** The Powerball taking a 30 annual payments, the first of which is immediate and the rest increase by 4% each year.

If the total of the Powerball payout is to be 365,000,000, how much is the first payment?

(A)  3.9 M

(B)  5.2 M

(C)  6.5 M

(D)  7 M

(E)  8.9 M