Solve the following problems intelligently and carefully. Show complete and clear solutions to get full points. Box your final answers. Only your final answers should be rounded-off. Answer only 6 items. (5 points each)

1. Interpret the following actuarial symbols:
   
   (a) \( 300 \stackrel{m}{\overline{a}_{30}} \)
   
   (b) \( 100(\overline{a}^{4}_{4})^{(4)}_{10|2} \)

2. Find the selling price of a 30 year annuity-intermediate with annual payments, having an initial payment of 20,000 and each payment thereafter decreases by 500, up until the 20th payment, after which all payments remain to be level. Let the annual interest rate be 8%.

3. Eli wants to accumulate an amount of Php 5,000,000 at the end of 15 years, by making level deposits every quarter for the whole 15 years on a newly opened savings account. The deposits earn at an annual rate of 9%, convertible quarterly, while interest is immediately reinvested at an annual rate of 6%, convertible quarterly. Calculate the amount that Eli needs to deposit every quarter.

4. Gene was offered a buy-out by another company that enables him to receive 30 payments made at the end of each year, starting immediately. The first payment is Php 250,000, with each payment thereafter to be adjusted to compensate for the change in the CPI. How much is the buy-out if the annual interest rate is 9% and the annual inflation rate is 7%?

5. Johannah is thinking of buying a 5-year annuity with the following features:
   
   • Payments commence each month, starting a month after the annuity is bought;
   
   • The monthly payments start at Php 5,000 and decreases by 1,000 each year thereafter.

   Find the maximum price that she can buy the annuity so as to have a monthly yield rate of at least 1%.

6. A perpetuity-intermediate with annual payouts of 150 costs 2,500. Under the same interest rate, calculate the selling price of a 6-year continuous annuity that pays at an annual rate of 100\( t + 200 \), where \( t \in [0, 6] \).

7. Dominique purchases the following securities:
   
   • A bond that gives a lump sum payment of 20,500 after two years and has a yield rate of 8%, and
   
   • A 2-year annuity-intermediate that has an annual pay-out of 14,000 and a yield rate of 5%.

   Find Dominique’s yield rate.

*************** 30 points total ***************

Any form of cheating in examinations or any act of dishonesty in relation to studies shall be subject to disciplinary actions.

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Answers

Answers are rounded to 2 decimal places.

1. (a) \(300 \cdot \frac{a_{30}}{s_{30}} = PV(t = 0)\) of a 30 year AI paying an amount of 300 every 6 years

   (b) \(100(I^{(4)}a^{(4)}_{10}|t = 2) = PV(t = 0)\) of a 10 year, 2 year deferred AI paying every quarter starting from 6.25 and increasing each payment by 6.25 every quarter, thereafter.

2. 176, 934.23

3. Php 42, 923.2

4. Php 5, 328, 156.11

5. Php 145, 534.97

6. 2, 443.37

7. 6.44%