1. A thirty-year annuity-immediate makes annual payments. The first 10 payments are of amount 100. The payments then decrease by 5 each year until the 20th payment, which is of amount 50. The last 10 payments are also of amount 50. The interest rate is 6% per annum. Find the present value of the annuity.

2. A perpetuity-due makes annual payments. The first 5 payments are of amount 5, the next five are of amount 6, the next five are of amount 7, and so on. If the annual effective interest rate is 3.5%, find the present value of the perpetuity.

3. A twenty-year annuity-immediate with annual payments, has a present value of 100. The first payment is $X$, and the payment amount increases by 6.09% each year. If $i = 0.03$, find $X$.

4. Jane receives 10-year increasing annuity-immediate paying 100 the first year and increasing by 100 each year thereafter. Mary receives a 10-year decreasing annuity-immediate paying $X$ the first year and decreasing by $X/10$ each year thereafter. at an effective rate of 5%, both annuities have the same present value. Calculate $X$.

5. A continuous annuity runs for 13 years. It pays at a rate 1 for the first 6 years, at a rate 2 for the next four years, and at a rate 4 for the next three years. Find the accumulated value of an annuity at the end of thirteen years, if the interest rate is 8% per annum, convertible semiannually.