1. Chris lends Dennis X at a rate of 12% per annum effective, at time 
\( t = 0 \). Dennis is to repay in three installments:

- 22.40 at \( t = 1 \),
- 28.10 at \( t = 3 \), and
- 15.74 at \( t = 4 \).

(a) What is X?

(b) The repayments are to be replaced by a single payment of 
\( 22.40 + 28.10 + 15.74 = 66.24 \). What time should this payment be at,

(i) using the equation of value,

(ii) using the method of equated time.

2. Suppose \( a_{\overline{n}|} = 5.5348 \) and \( a_{\overline{2n}|} = 8.3126 \). Find \( i \) and \( n \).

3. You are given an annuity-immediate with 11 annual payments of 100 
and a final balloon payment of \( X \) at the end of 12 years. At an annual 
effective interest rate of 3.5% the present value at time 0 of all the 
payments is 1000.

(a) Find \( X \).

(b) Using an annual effective rate of 1%, calculate the present value at 
the beginning of the ninth year of all the remaining payments.

4. A large state borrows $300 million in a bond issue to pay for redwood 
forests. It will pay the money back in 20 equal installments at an 
annual interest rate of 7.5%. Find the total interest the state will pay.

5. If \( a_{\overline{n}} = 1.7 \), find \( i \).