

ISE 307 — In-Class Activity 09

Loans, Interests Rates, and Inflation

Team members (name):

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Scenario. Your project team needs to borrow **500,000 SAR** today to buy equipment for a 10-year project. Three lenders are competing for your loan. You will (1) choose the cheapest offer, (2) build its repayment schedule, and (3) see what changes once inflation is on the table.

Problem 1 — Which loan is cheapest? (30 pts)

You receive three quotes to lend you 500,000 SAR. Compute the effective annual rate i_a for each offer and fill the last column.

1. Fill in the table below.

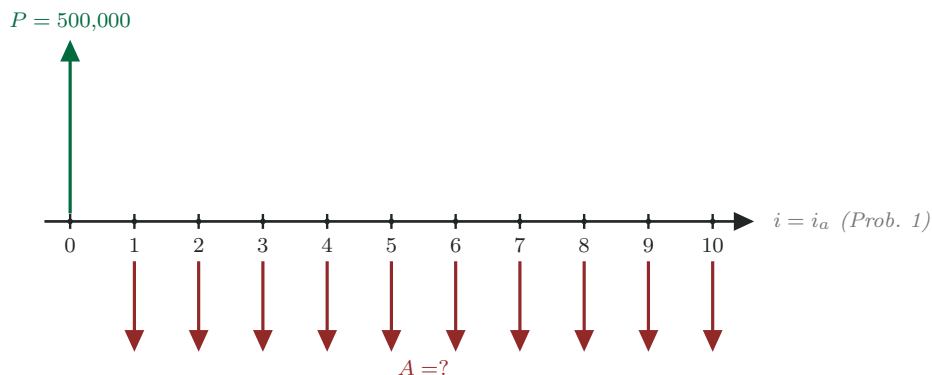
Offer	Lender	Nominal rate r	Compounding	i_a (effective annual)
A	National Bank	12.0%	annually ($M = 1$)	_____
B	Equipment Vendor	11.7%	monthly ($M = 12$)	_____
C	Development Fund	11.5%	daily ($M = 365$)	_____

Work space for 1.2

2. From **your project team's perspective (the borrower)**, which offer is cheapest? Note that the cheapest offer does *not* have the lowest quoted rate. Explain in one or two lines why comparing the quoted rates directly is misleading.

Problem 2 — Repaying the chosen loan (40 pts)

You take the offer chosen in Problem 1. Treat its effective annual rate as the loan's annual rate i , and repay the 500,000 SAR in **equal annual payments over $n = 10$ years**.



1. **Annual payment.** Find the level annual payment $A = P(A/P, i, 10)$.

2. **Splitting payments into interest and principal.** Each annual payment is part interest (charged on the *remaining balance*) and part principal (what is left repays the loan). For a payment in year t :

$$\text{interest}_t = i \times (\text{balance at start of year } t), \quad \text{principal}_t = A - \text{interest}_t.$$

The balance at year t is the present worth of the remaining payments at the beginning of the year: $B_t = A(P/A, i, 10 - t + 1)$. We add 1 to the number of periods because we want the balance include that year's payment (current payment plus all later ones).

Fill in the interest and principal for the **first**, the **midway**, and the **last** payment.

Payment	Balance at start	Interest _t	Principal _t	Balance at end
First (year 1)	500,000.00	_____	_____	_____
Midway (year 5)	_____	_____	_____	_____
Last (year 10)	_____	_____	_____	0.00

Work space for 2.2