

* Reducing - Balance Loans.

The recurrence relation for these loans is

$$V_0 = \text{Principal} \quad V_{n+1} = R V_n - D.$$

- $R = 1 + \frac{r}{100}$

- r is the interest rate per compounding period

- V_n is Balance after n payments

- D is the payment made.

Eg Alyssa borrows \$1000 at an interest rate of 15% p.a., Compounding monthly. She will repay the loan by making four monthly payments of \$257.85

- Construct a recurrence relation to model this loan.
- Using your calculator find the balance after the four payments.
- Is the loan fully paid out after four payments? If not, how much will the last payment need to be?

Solⁿ $r = 15\% \text{ p.a.} = \frac{15}{12} = 1.25\% \text{ per Month}$
 $R = 1 + \frac{1.25}{100} = 1.0125$

a) $V_0 = 1000 \quad V_{n+1} = 1.0125 V_n - 257.85$

b) $V_1 = 754.65$
 $V_2 = 506.23$
 $V_3 = 254.71$
 $V_4 = 0.04$

c) No.

$$\begin{aligned} \text{Last payment} &= 257.85 + 0.04 \\ &= \$257.89. \end{aligned}$$