8B – Reducing Balance Loans & Annuities

**REDUCING BALANCE LOANS (WITH REGULAR PAYMENTS)**

If you make regular payments on a compound interest loan (each compounding period), the recurrence relation becomes:

The value of R can still be calculated using:

… where p is the number of compounding periods per year

And **D is the regular payment** on the loan each compounding period.

*You borrow $2500 at 8% per annum, compounding quarterly. Your payments are $200 per quarter.*

1. *Determine the value of both R and D*
2. *Write the recurrence relation for your reducing balance loan*
3. *Use NestList to calculate the value of your loan each quarter for 6 quarters (1.5 years):*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| V0 | V1 | V2 | V3 | V4 | V5 | V6 |
|  |  |  |  |  |  |  |

1. *By changing the number of iterations, find out how many quarters it will take for your loan to be paid off:.*
2. *Work out how much the final quarterly payment was by finding the last positive balance of the loan and adding the interest to this balance:*

8B – Reducing Balance Loans & Annuities

**ANNUITIES (WITH REGULAR WITHDRAWALS)**

If you make regular withdrawals on a compound interest investment (each compounding period), the recurrence relation becomes:

The value of R can still be calculated using:

… where p is the number of compounding periods per year

And **D is the regular withdrawal** from the annuity each compounding period.

*You invest $120000 in an annuity at 6% per annum, compounding monthly. Your withdrawals for living expenses are $1000 per month.*

1. *Determine the value of both R and D*
2. *Write the recurrence relation for your annuity*
3. *Use NestList to calculate the value of your annuity each month for 6 months:*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| V0 | V1 | V2 | V3 | V4 | V5 | V6 |
|  |  |  |  |  |  |  |

1. *By changing the number of iterations, find out how many months it will take for your annuity to be used up:*
2. *Work out how much the final withdrawal is by finding the last positive balance of the annuity and adding the interest to this balance:*