7E – Using an Explicit Rule for Geometric Growth or Decay

**GENERATING A LIST FOR A GEOMETRIC SEQUENCE**

Remember that a recurrence relation for a geometric sequence is written as:

Recurrence relations are used to generate each term from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ one.

You can use NestList in your Mathematica notebook to create a geometric sequence

this way.

**FINDING A PARTICULAR TERM IN A GEOMETRIC SEQUENCE**

An explicit rule for a geometric sequence is written as:

An explicit rule is used to calculate the value of a particular term number in the

geometric sequence.

You can use a function in your Mathematica notebook to do this if you want to, although it develops a better understanding to practice by hand first.

*For the following geometric sequences*

* *use a recurrence relation to list the first four terms*
* *use an explicit rule to find the value of t8*

|  |  |  |  |
| --- | --- | --- | --- |
| Recurrence Relation | First 4 Terms | Explicit Rule | t8 |
| t0 = 1 , tn+1 = 4 tn |  |  |  |
| t0 = 1000 , tn+1 = 0.1 tn |  |  |  |
| t0 = 20 , tn+1 = tn |  |  |  |

7E – Using an Explicit Rule for Geometric Growth or Decay

**COMPOUND INTEREST INVESTMENTS**

If you invest an initial amount of money (V0) at a compound interest rate (r %), the the common ratio (R) between the terms is given by:

The value of the investment after a particular number of time periods can be calculated using the explicit rule:

where…. Vn is the value of the investment after n time periods

V0 is the principal (the amount initially invested)

R is the common ratio between consecutive terms

*For a compound interest investment of $1000 at 6.5% per annum, determine the value of the common ratio and then use the explicit rule to calculate the value of the investment after 13 years:*

7E – Using an Explicit Rule for Geometric Growth or Decay

**REDUCING BALANCE DEPRECIATION**

If an asset depreciates (loses value) by an annual percentage from the year before (r%), the **decimal proportion of the value it keeps** each time period is the common ratio between the terms:

The value of the asset after a particular number of time periods can be calculated using the explicit rule:

where…. Vn is the value of the asset after n time periods

R is the common ration between consecutive terms

*A car with a purchase price of $18500 depreciates at a reducing balance rate of 10% per annum. Calculate the common ratio and then use the explicit rule to calculate the value of the car after 8 years:*