7A – Sequences and Recurrence Relations

**BEHAVIOUR OF SEQUENCES**

A sequence is a list of numbers or symbols in a particular \_\_\_\_\_\_\_\_\_\_\_.

The individual items in a sequence are called \_\_\_\_\_\_\_\_\_\_ and are separated by commas.

Sometimes sequences are random, but we are most interested in sequences that are

generated using a repeated maths operation ( \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ relations).

Some typical sequence behaviours are shown below. Label each one as increasing, decreasing, oscillating or constant:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: -3, -3, -3, -3, ….

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: 100, 90, 80, 70, ….

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: 1, 4, 9, 16, 25, 36, ….

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: 10, -8, 10, -8, 10, -8, ….

**RECURSION**

Recursion involves generating a sequence using an \_\_\_\_\_\_\_\_\_\_\_\_ value and a

repeated maths operation.

The operation can be addition, subtraction, multiplication or division by the same amount each time. It can also be a combination of these.

*For each of the following sequences, state the recurrence relation:*

|  |  |
| --- | --- |
| **Sequence** | **Recurrence Relation** |
| 2, 8, 14, 20, …. | V0 = Vn+1 = |
| 5, 15, 45, 135, …. |  |
| 7, 4, 1, -2, …. |  |
| 1000, 200, 40, …. |  |

Now open your Chapter 3 notebook and generate the first 10 terms

for each of the above sequences using NestList.

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**NAMING THE TERMS IN A SEQUENCE**

*For the following sequence, write down the recurrence relation, as well as the term specified:*

54, 50, 46, 42, 38, 34, 30, 26, …. V0 = Vn+1 = V3 =

**GENERATING A SEQUENCE FROM A RECURRENCE RELATION**

*Use NestList on Mathematica to generate the first 6 terms for the following recurrence relations:*

|  |  |
| --- | --- |
| RECURRENCE RELATION | FIRST 6 TERMS |
| V0 = 30 Vn+1 = Vn – 7 |  |
| V0 = 625 Vn+1 = Vn ÷ 5 |  |
| V0 = 4 Vn+1 = 2 Vn – 1 |  |