


## Chaos Theory - Rabbits

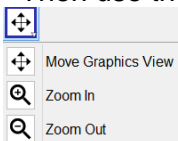
1. Open Geogebra and open the spreadsheet view (go to View – Spreadsheet)
2. In cell A3 input the text “Time” and in B3 input the text “Rabbits”
3. In cell A4 input **0** and in cell A5 input  $=A4 + 1$  and then drag to cell A54.
4. In cell B4 input 0.5
5. Click with the mouse anywhere on the graph to see the geometry toolbar come back:



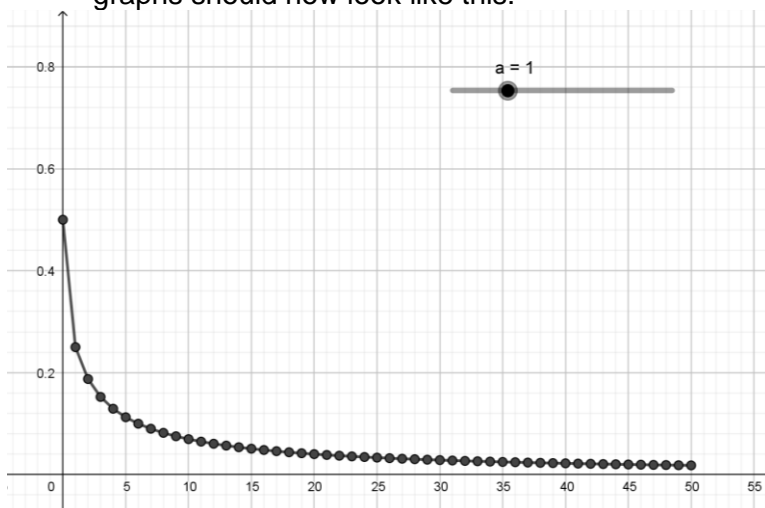
6.  Using this button, create a **slider**  $a$  with numbers from 0 to 4 with an increment of 0.1
7. In cell A1 write  $=a$  (this will link it to your slider)
8. In cell B5 input  $=\$A\$1 * B4 * (1 - B4)$
9. Highlight cells A4 to B54 and create a polyline by right clicking and selecting Create – Polyline


You should now be able to see the sequence of points on the graph, but it would be best to change the scale of the graph

10. Right click anywhere on the graph and click on xAxis:yAxis. You can choose a better ratio that 1:1 for this data.
11. Then use the tools in this menu to move your graph around and zoom in and out



12. Click on Point in the Algebra view on the left hand side to highlight all points then right click and click Show Label. This will stop showing the labels A, B, C... etc. Your graphs should now look like this:



You can now adjust the slider (making sure you are on the  first) to see what happens to the rabbits for different values of  $a$ .

What different behaviours can you see?