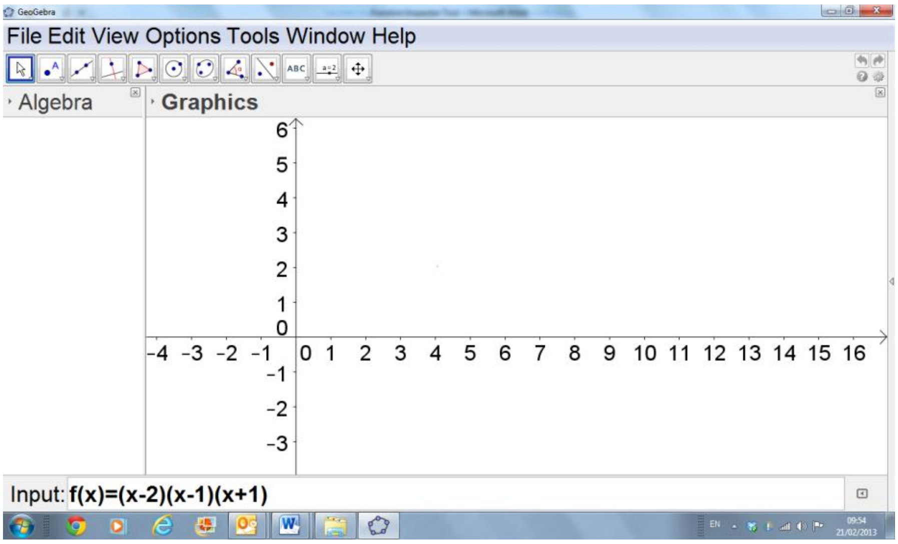
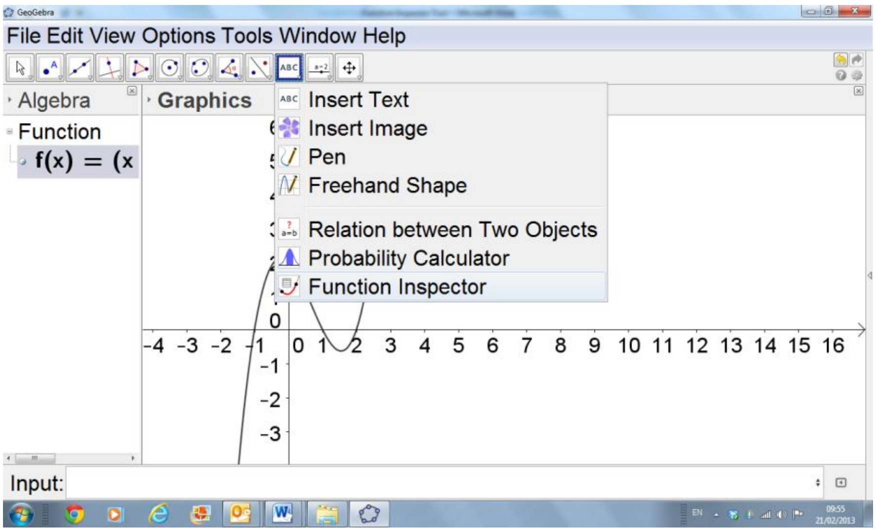
Function Inspector Tool

Note when the keyboard is mentioned in these notes you can use the keyboard on your machine or the virtual keyboard supplied with GeoGebra. See Appendix 3 of these notes on how to access this keyboard.

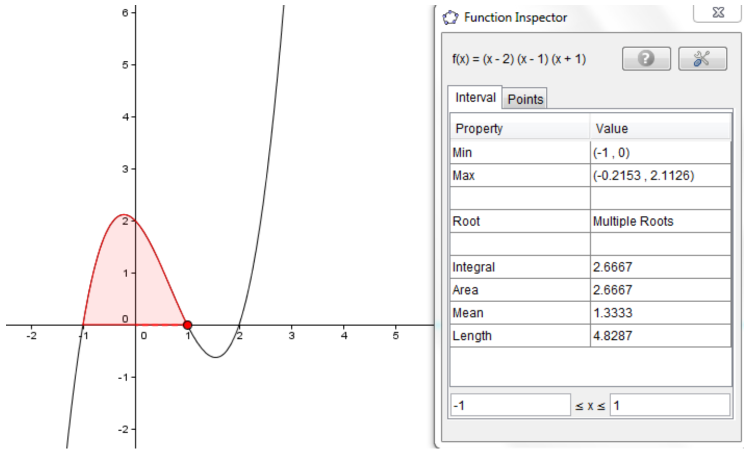
1. Draw a function for example $f(x) = (x-2)(x-1)(x+1)$, by typing $\mathrm{f(x) = (x-2)(x-1)(x+1)}$ in the Input Bar at the bottom of the screen and press Enter on the keyboard.



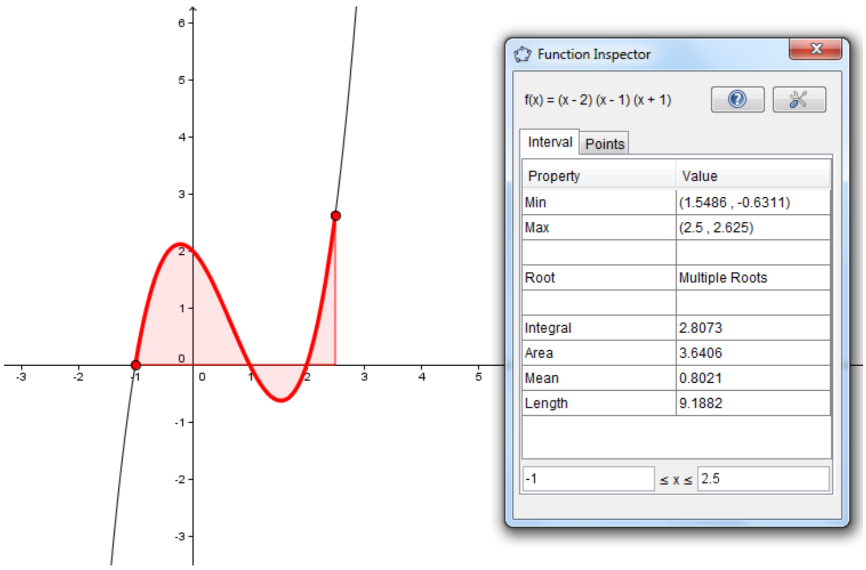
2. In the third set of tools from the right of the toolbar click on the Function Inspector tool  .



3. Select the function in the Graphics View that you want details of. In this case click on $f(x) = (x-2)(x-1)(x+1)$.
4. A new window appears. (Watch this may contain settings from your previous use of GeoGebra.)

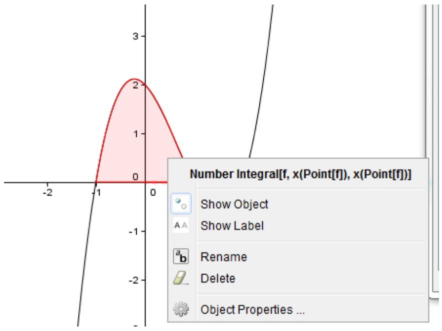


5. With the Interval tab open type the interval you want to examine for example $-1 \leq x \leq 2.5$. N.B. **<u>You must press the Enter button on your keyboard after each number for it to take effect</u>**.
6. The interval is marked on the curve in red and the information like Min, Max, Root, Integral and Area are now given for that interval in the table.

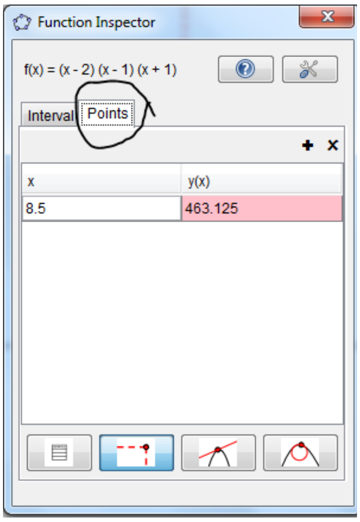


Note the Max and the Min that is given in this table is the maximum value and minimum value of the function <u>in the interval that the Function Inspector is investigating</u>.

7. The Mean is the "Average value" of the function. It is the area underneath the curve divided by the length of the interval.
8. If you do not wish the interval to be shown on the Graphics View, you can right click on this section of the function and deselect Show Object.

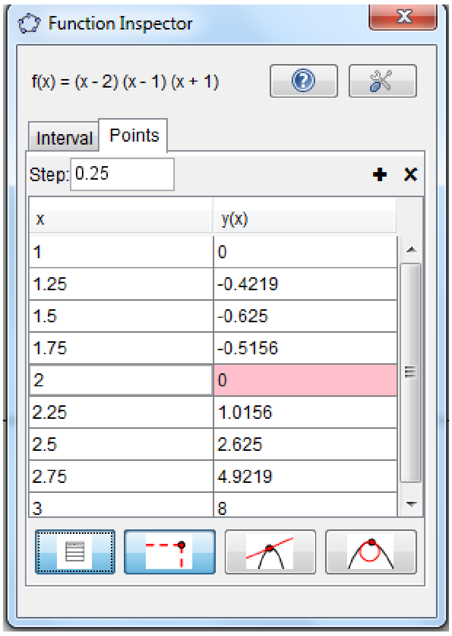


9. Open the Points Tab.

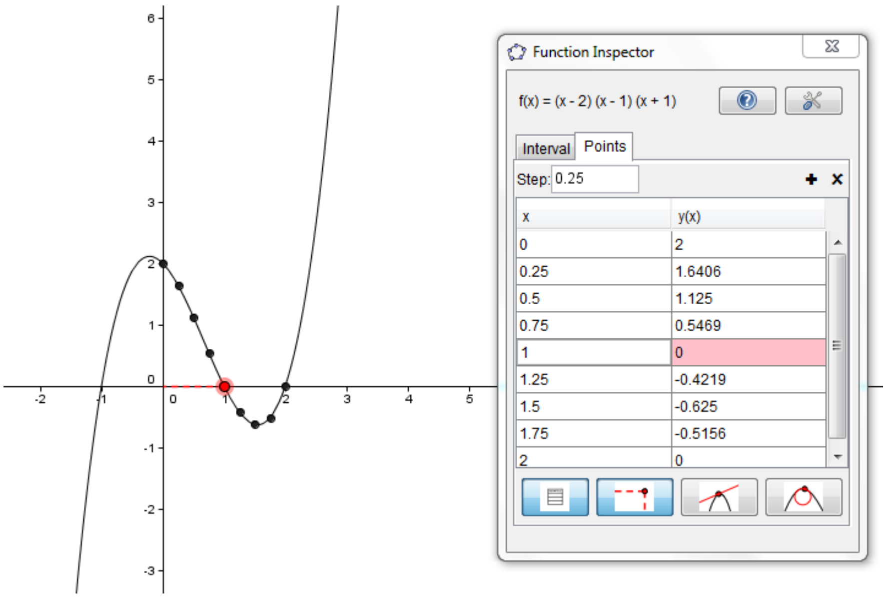


Note if the point shown on the table above is not visible on the Graphics view replace it with a value that is visible.

10. Click on the Show table of points button . Notice the x and $y(x)$ values appear on the table.



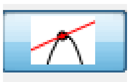
11. Note the point that is highlighted in the table will have a red dot on the graph.

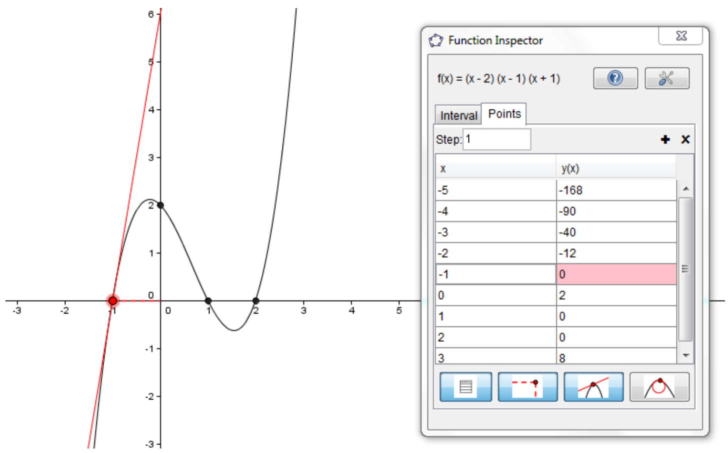


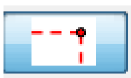
12. To change the Step to 1. Delete the current value using the Backspace button on your keyboard, press 1 and Enter on the keyboard.

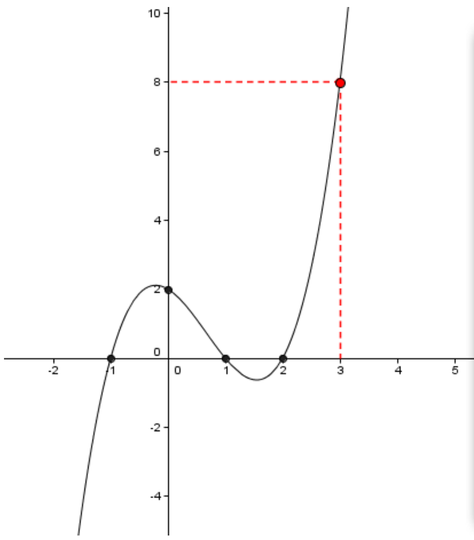
13. To change the values in the table, move the red point on the Graphics view that now appears on the curve until the required points appear in the table. Four points to the right and four to the left of the red point will appear on the table.

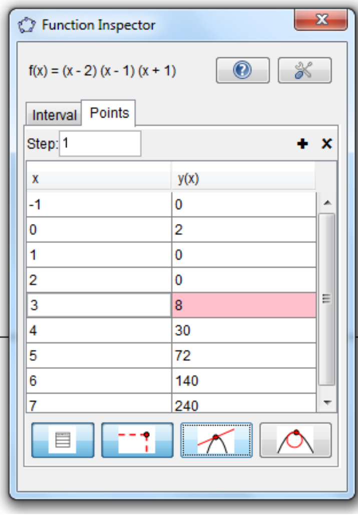
14. If you just require integer values for the x co-ordinate go to Options, Point Capturing and choose Fixed to Grid. Move the red dot on the Graphics view. You can also double click on the x coordinate of the point highlighted in the table and type in the number you want.

15. By clicking on Show tangent line button  you can show the tangent at the point highlighted in the table.

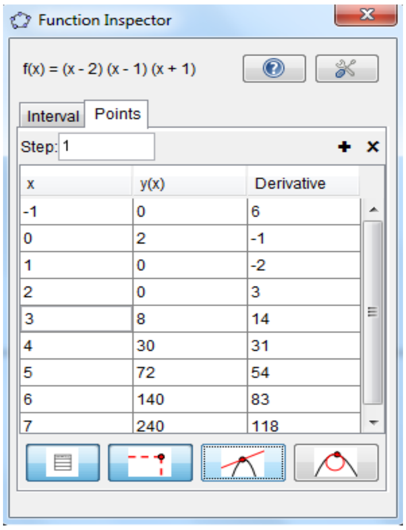


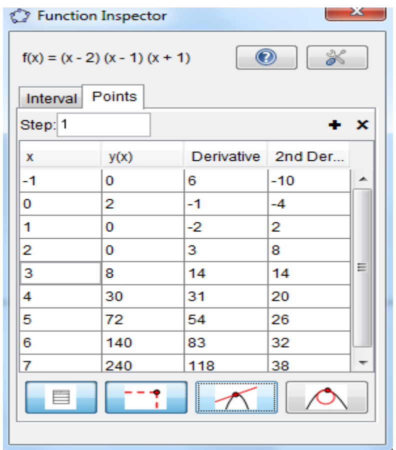
16. By clicking on the Show x, y position lines button  you can show the x y position of the point highlighted in the table.





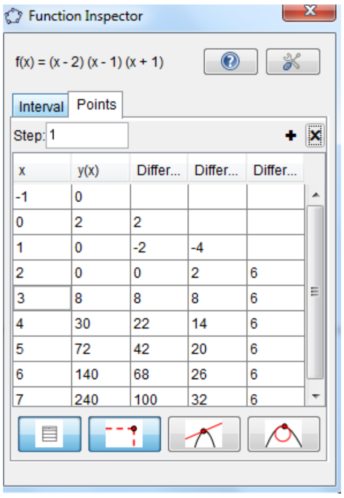
17. To add the derivative, second derivative, difference or curvature to the table click on the  button and choose Derivative, 2nd Derivative, Difference or Curvature.





18. To remove the right column on the table click on the  button.

19. To add other columns to the table re-click the  button as often as required.

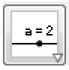


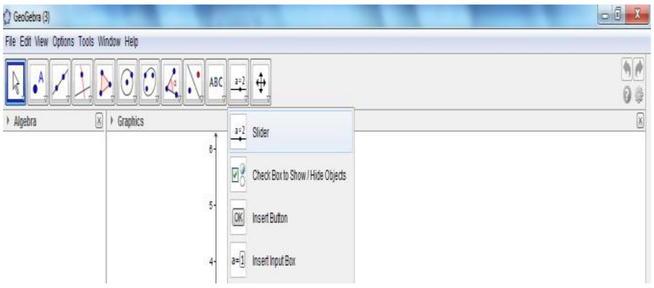
x	y(x)	Differ...	Differ...	Differ...
-1	0			
0	2	2		
1	0	-2	-4	
2	0	0	2	6
3	8	8	8	6
4	30	22	14	6
5	72	42	20	6
6	140	68	26	6
7	240	100	32	6

See Appendix 1, where this tool is used to show the derivative of a quadratic is linear.

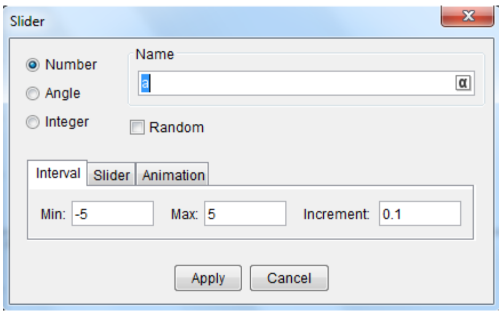
<u>N.B. Note work done using the Function Inspector cannot be saved, it must be done in class.</u>
You could copy and paste this information to the Spreadsheet and then save it. See Appendix 2.

Appendix 1: The demonstrate the derivative of a quadratic is linear

1. Go to File and New window to start a new file.
2. Select the Slider tool .



3. Click on the screen and a new window appears.

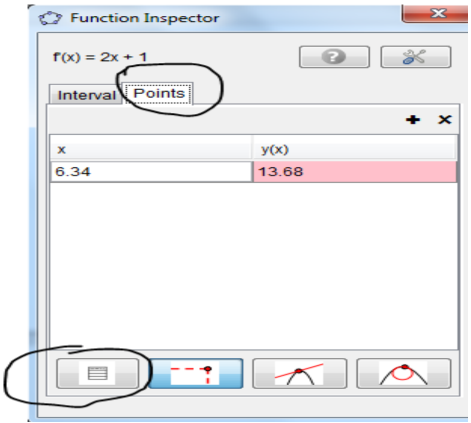


4. Change the Min to -10, Max to 10 and increment to 1. Click Apply. This creates a slider called a.
5. Repeat steps 2, 3 and 4 above to make a slider called b, with the Min equal to -10, Max equal to 10 and increment equal to 1.
6. Repeat steps 2, 3 and 4 above to make a slider called c, with the Min equal to -10, Max equal to 10 and increment equal to 1.
7. In the Input bar type f(x)=ax^2+bx+c and press Enter on the keyboard.

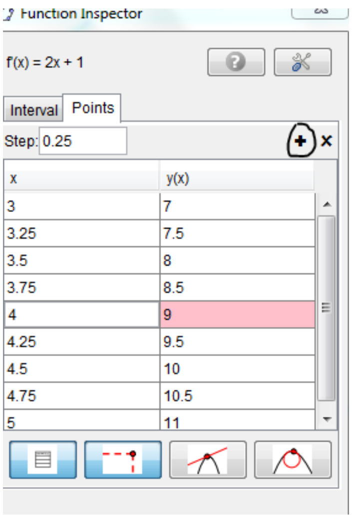
8. In the Input bar type f’(x). This will enable the first derivative of the function f(x) to appear on screen. (Provided your original function is called f.)

9. Go to Function Inspector  and click on the derivative of the function.

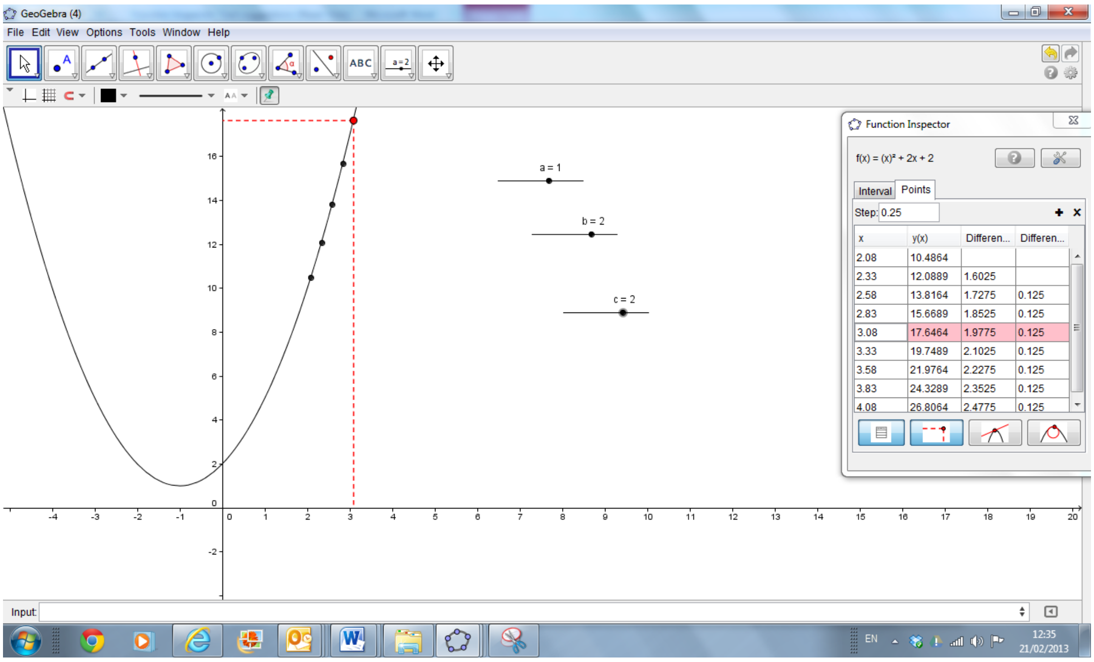
10. Open the Points tab and click on the Show table of Points button.



11. Click on the + button and choose Difference. Notice the values for the differences are all the same.

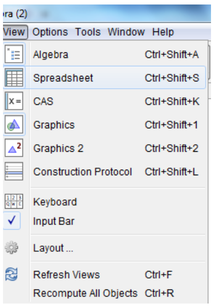


12. Move the sliders and while the values for the Difference changes depending on the values of your sliders you will notice the values for the Difference all stay the same for all values of x for a particular set of values for the sliders.

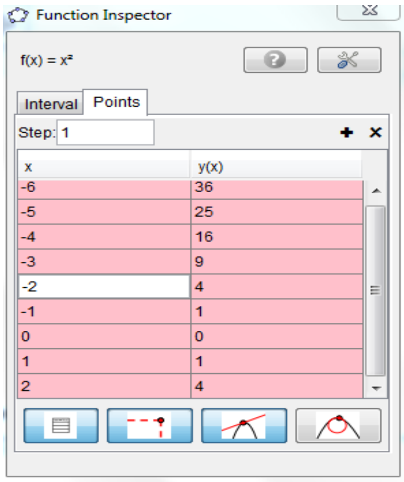


Appendix 2: To transfer points from the Function Inspector to Spreadsheet View

1. If the Spreadsheet is not already in view, go to View and choose Spreadsheet.



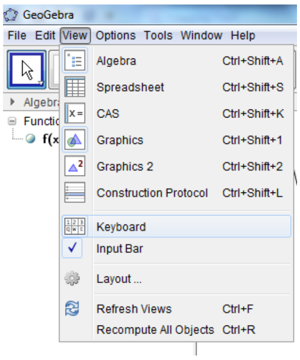
2. Highlight the data in the Function Inspector by dragging the cursor over them. Press Control and C on your keyboard.



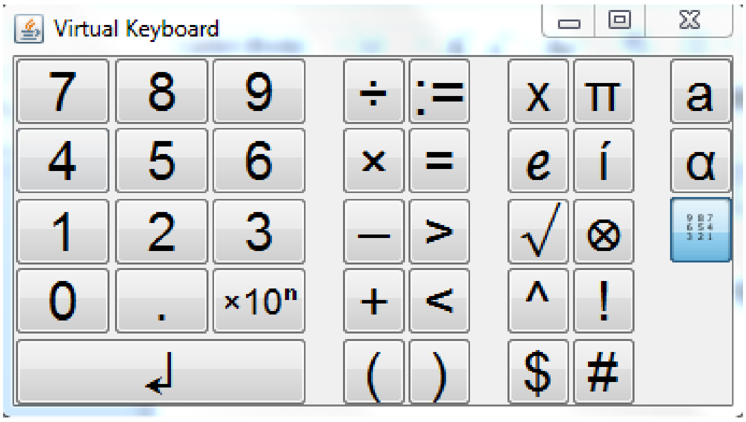
3. Click on the Spreadsheet where you wish to insert the data and press Control and V on your keyboard.

Appendix 3: How to use the virtual Keyboard in GeoGebra

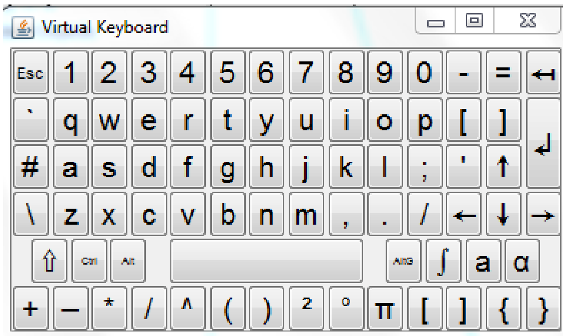
1. Go to view and choose Keyboard.



2. A virtual keyboard appears.



3. If the keyboard below does not appear click on the  key on the virtual keyboard above and the following keyboard appears.



4. Then click on the  key on the virtual keyboard to get the Maths keyboard.