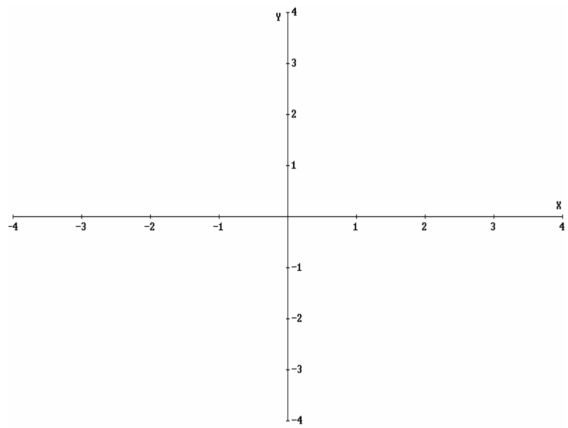
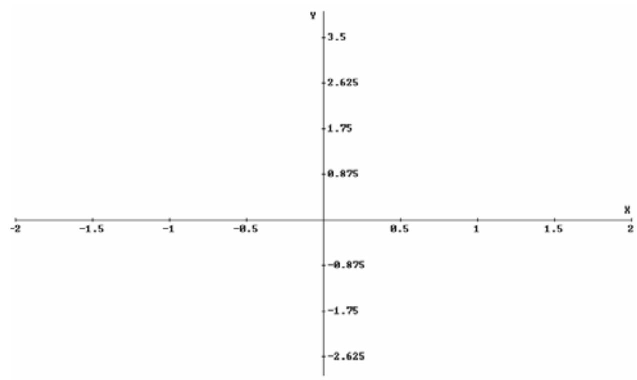
Assignment 2: Graphing Functions (0.3) **Name___________________**
Please provide a handwritten response.



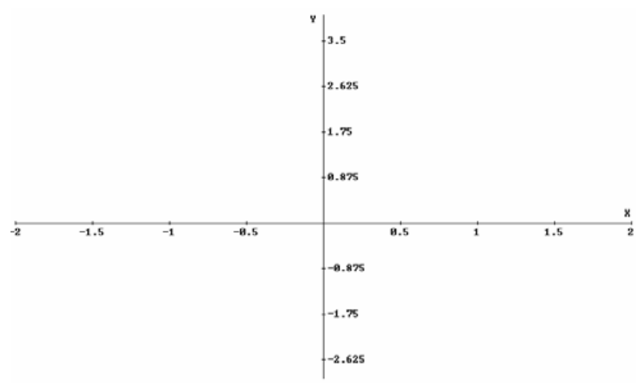
1a. In *Derive*, functions $y = f(x)$ are graphed by selecting from the shortcut menu. This command opens a 2D-Plot window in which we can plot the graph by clicking **Insert→Plot** from the menu at the top.

For example, **Author** the function f(x) := x^2 to define the familiar function $f(x) = x^2$. Next, click to open a graphics screen. Finally, click **Insert→Plot**. (We can also click again to **Insert→Plot**.) Sketch the result on the axes above.

1b. *Derive* automatically displays an *x*-range and *y*-range of $[-4,4]$, regardless of the function being graphed. However, we can specify different ranges while in the 2D-Plot window by selecting **Set → Plot Range** then entering the new range limits. Change the horizontal range to $[-2,2]$ (min = -2 and max = 2) and the vertical range to $[-3,4]$ (min = -3 and max = 4). Leave **Intervals** at 8. Sketch the results on the axes at right. (*Derive* sometimes "adjusts" the range for us!)



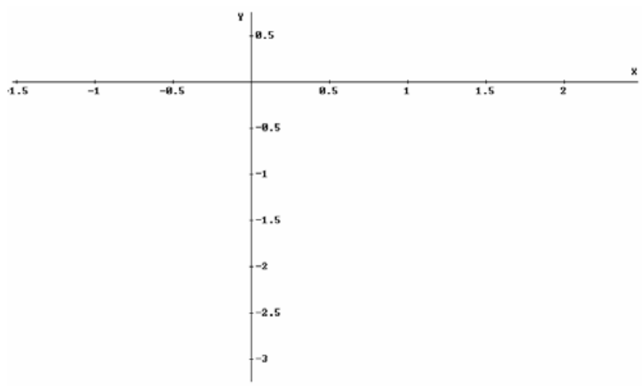
1c. *Derive* can also graph two or more functions together. Click to return to the Algebra window. **Author** and highlight g(x) := 4 - x^2 then click to return to the 2D-Plot window. Notice that $f(x) = x^2$ is still visible. Finally, click to see $g(x) = 4 - x^2$. What happened? Sketch your result on the axes at right.



We can delete the last plot by clicking . If we want to again see the last plot, click to recover it (provided it was highlighted in the Algebra window). We can plot more functions by simply entering them in the Algebra window, highlighting the functions we wish to plot, clicking to return to the 2D-Plot window, and clicking to plot the function.

2a. We can also "zoom" in on details of graphs like $y = x^3 + 4x^2 - 5x - 1$. Return to the Algebra window by selecting . **Author** and highlight $f(x) = x^3 + 4x^2 - 5x - 1$. Open a new 2D-Plot window by clicking **Window** → **New 2D-plot Window** then click to plot the function.

2b. The graph seems to have a local minimum between $x = 0$ and $x = 1$; we can use zooming to locate this minimum as accurately as we wish. Place the cross hairs near the minimum by clicking the mouse pointer there. Click to center the screen on the cross. Click to "zoom in" and sketch the result on the axes at right. (*Derive* may not show the *x*-axis. If so, center the screen on another point where the *x*-axis is visible.)



2c. We can now see that the minimum actually lies very close to $x = 0.5$. Place the cross hairs near the minimum again, click to center the screen, and click to zoom in. At this point, *Derive* may show neither the *x*-axis nor the *y*-axis because we may be zoomed in so close that the axes are not visible. We can, however, still see the location of the cross hairs in the lower left corner of the screen beside "Cross:". We can move the cross hairs by either clicking a new location with our mouse or using the arrow keys on our keyboard. Do this and note the location of the cross hairs. We can continue zooming and looking at the cross hairs location until we find the minimum to whatever accuracy we wish. What is the "best" location we can find for the minimum? Record the location below.

3. Return to the Algebra window and **Author** the function $f(x) = \dfrac{x-1}{x^2 - 5x + 6}$. Plot $f(x)$ using a horizontal range of $[0,4]$ and a vertical range of $[-10,8]$. Sketch the result on the axes at right. What occurs at $x = 2$ and $x = 3$?