

**For each graphing problem, use the appropriate keyword, not the plot-builder. Also, no comment sheet has been prepared for this lab — use the Maple help system or Maple User Manual (5.2 & 5.3) for information on commands and command options.**

1. Given a function of two variables

$$f(x, y) = 4x^2 - 3y^2 \text{ for } x \in [-5, 5] \text{ and } y \in [-5, 5]$$

- (a) Use the `plot3d` command to create a surface plot with boxed axes.
- (b) Use the `contourplot` command from the Plots (`plots`) package to create a contour plot. Note: Load the Plots package first.
- (c) Create a function to transform two-dimensional graphs into three-dimensional graphs by loading the Plot Tools (`plottools`) package and then typing in:

$$g := \text{transform}((x, y) \rightarrow [x, y, zmin]) :$$

where `zmin` is the minimum  $z$ -value in the plot from part (a). Note: The colon at the end of the command just suppresses the output.

- (d) In the same coordinate space, display both the surface plot and contour plot for this function. To do this, give a name to the commands that were used in parts (a) and (b), and then use the command:

$$\text{display}(\text{namea}, g(\text{nameb}))$$

2. Given the function of two variables

$$f(x, y) = y \sin(x) + x \cos(y) \text{ for } x \in [-8, 8] \text{ and } y \in [-8, 8]$$

- (a) Create a surface plot using a  $50 \times 50$  grid for plotting the points.
- (b) Create a contour plot.
- (c) In the same coordinate space, create both a surface plot and a contour plot.  
Note: Since the value of `zmin` is different, define a transform function for this problem different from `g` used in 1(c).

3. Given the function of one variable

$$f(x) = \left| \sin(x) \right|$$

- (a) Create two coordinate plane graphs, one with  $x \in [0, 2\pi]$  and one with  $x \in [\pi, 3\pi]$ .
- (b) Create a surface plot where the graph with domain  $[0, 2\pi]$  is rotated around the  $x$ -axis. Use normal axes.
- (c) Create a surface plot where the graph with domain  $[\pi, 3\pi]$  is rotated around the  $y$ -axis. Use normal axes.

Maple has a tutors that create surfaces and volumes of revolution. Though you are to create your own plots, you may want to also look at the plots created by the tutor **Tools-Tutors-Calculus-Single Variable-Surface of Revoluton** or **Volume of Revolution**.