

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 (6.2 & 6.3) for information on commands and command options.

1. Given a function of two variables

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

- (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

$$f(x, y) = y \sin(2x) + 2x \cos(y) \text{ for } x \in [-10, 10] \text{ and } y \in [-10, 10]$$

- (a) Create a surface plot using a 100×100 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

$$f(x) = \left| 3 \sin(2x) \right|$$

- (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 Revolution** or **Volume of Revolution**.