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:

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

   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**.