1. Complete each exercise for the functions f and g where they are defined by

$$f(x) = 2x^3 - 7x + 5 \text{ and } g(x) = 15 - 6x - x^2.$$

   (a) Do each of the following.

      i. Define each of the functions f and g.

      ii. Define a function for the sum of f and g. Evaluate on the input $x = c$.

      iii. Define a function for the quotient of f and g where g is the divisor. Evaluate on the input $x = c$ and simplify.

      iv. Define a function for the composition $f \circ g$. Evaluate on the input $x = c$ and simplify.

   (b) Find the **exact value** of f, g, the sum, the quotient, and the composition when $x = 2\sqrt{3}$. *Simplify all of the answers.*

   (c) Evaluate $g(a^2)$, $f(3t - 2)$, and $g(a + h)$. *Simplify each.*

   (d) Graph both f and g on the same coordinate plane where $x \in [-3, 2]$. Use standard (normal) crossed axes, make each curve a *different* solid color, show gridlines, show a title and legend, use the function names in the legend, and make the coordinate plane as wide as the display. Also, use the **Point Probe** to *estimate* the intersection points of the graph (state the intersection points in a sentence).

   (e) Evaluate each of the following limits.

      i. $\lim\limits_{x \to 0} \dfrac{f(x)}{g(x)}$

      ii. $\lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$

2. The 2008 Minnesota State Income Tax Schedule for the filing status of Married filing jointly or Qualifying widow(er):

Taxable income is over	But not over	Amount of Tax	Of the amount over
\$0	\$31,860	5.35%	\$0
\$31,860	\$126,580	\$1,704.51 + 7.05%	\$31,860
\$126,580	or over	\$8,382.27 + 7.85%	\$126,580

   (a) Define the tax function using a piecewise defined function. Use 'Tax' for the function name. *Does your definition consider negative income?*

   (b) Find the amount of tax owed on taxable income of \$25,000, \$60,000, and \$175,000. Show the results in *normal notation for a dollar amount.*

   (c) Graph the tax function with an appropriate scale, label the axes, and title the graph. Use boxed axes, *show at least some negative income*, and choose an appropriate maximum income.

   (d) How many line segments are there in the graph? What does the slope of each line segment represent?

   (e) Use a matrix to create a tax table from \$0 to \$200,000 with increments of \$10,000. The first column should be the taxable income and the second column should be the tax.

3. The voltage V produced by an AC generator (with t in seconds) is

$$V = 110\cos(120\pi t).$$

   (a) *Approximate* the voltage for $t = 1/240$.

   (b) Use a matrix to create a table approximating the voltage to five decimal places for the times $t = 0, 0.001, 0.002, 0.003, \ldots, 0.01$. The first column should contain the times and the second column the corresponding voltages.

   (c) Graph the voltage function for the interval $t \in [0, 0.2]$. Show a title and axes labels.