Uses for Graphing Technology

Work within a small group to answer these questions. Do not race through the exercises on your own. Always make sure that your entire group feels good about a question and answer before you move to the next exercise. Ask your group mates for explanations if you feel uncertain about something, and offer your explanations to others when you understand an exercise but someone else may not.

These questions have many acceptable answers. These are just some valid viewing windows. Yours may be different, but valid.

1. Use graphing technology (a graphing calculator or an app) to find a good viewing window for f, where $f(x) = x^3 + 20x^2 - x - 40$. There is not just "one" correct answer for a question like this. Any viewing window that shows all of this function's features will work. A good way to write down a viewing window is like this: $[-10, 10] \times [-10, 10]$. The first interval is the visible portion of the horizontal axis, and the second interval is the visible portion of the vertical axis.

   One that works is

   $[-30, 10] \times [-1000, 2000]$

2. Find good viewing windows for these functions as well:

   a) $g(x) = \dfrac{9x + 450}{x - 60}$ $[-250, 250] \times [-120, 120]$

   b) $h(x) = \dfrac{x^{30}}{x^{40} + 1}$ $[-4, 4] \times [-2, 2]$

   c) $h(x) = \dfrac{1.08^x}{\sqrt{x - 80}}$ $[0, 200] \times [-1500, 3000]$

3. Use graphing technology to find the coordinates of all "interesting" points on the graph of q, where $q(x) = x^2 - 5x + 1$. An "interesting" point is a point where the graph crosses one of the axes, or where the function takes a local minumum or a local maximum value. It is OK to round any decimal answers your technology provides you with. We encourage you to round to four significant digits.

   y-intercept at (0,1) x-intercepts at about (0.2087, 0) and (4.791, 0).

   Local minimum at (2.5, -5.25)

4. Find "interesting" points for these functions as well:

   a) $r(x) = x^3 - x^2$

   x-intercept: (0,0), (1,0)

   y-intercept: (0,0)

   local maximum: (0,0)

   local minimum: (0.6667, -0.1481) at about

   b) $s(x) = \dfrac{x}{x^2 + 1}$

   x-intercept: (0,0)

   y-intercept: (0,0)

   local minimum: (-1, -0.5)

   local maximum: (1, 0.5)

   c) $t(x) = \dfrac{x^2 + 3x - 5}{1.5^x}$

   x-intercepts: (-4.193, 0), (1.193, 0)

   y-intercept: (0, -5)

   local minimum: (-2.685, -17.36)

   local maximum: (4.618, 4.640)

5. Use graphing technology to solve the equation $x = x^2 - 3x - 8$. Find all of the solutions. It is OK to round any decimal answers your technology provides you with. We encourage you to round to four significant digits.

$x = -1.464...$ or $x = 5.464...$

6. Solve these equations as well:

a) $\frac{1}{x} = \sqrt{x+2}$

$x = 0.6180...$

b) $x^3 = \frac{1}{x^2+1}$

$x = 0.8376...$

c) $5 - 0.2x^2 = \cos(x)$
(cos is a function from trigonometry. Don't worry if you are unfamiliar with it. Just use your technology's ability to plot and solve with it.)

$x = -4.909...$

or

$x = 4.903...$

7. Use graphing technology to solve the inequality $x^2 - 3x < x + 1$. Express the solution set using interval notation. It is OK to round any decimal answers your technology provides you with. We encourage you to round to four significant digits.

the interval $(-0.2360..., 4.236...)$

8. Use graphing technology to find the maximum and minimum values for J, where $J(x) = \frac{1}{x^4+x+2}$. You may find that there is no maximum value, or no minimum value. It is OK to round any decimal answers your technology provides you with. We encourage you to round to four significant digits.

maximum value of $0.6546...$ (when x is $-0.6299...$)