Graphing Examples

Math 130 *Kovitz*

For each equation:

- If indicated, find an equivalent equation that will be easier to graph.
- Describe the graph verbally, stating the shape, quadrants, symmetries, endpoints, and asymptotes. Also state whether it is increasing and (if applicable) state the concavity.
- Give the exact or approximate coordinates of all intercepts, maximum or minimum points, and endpoints (if any).

1. $\frac{1}{6}x + \frac{1}{12}y = \frac{1}{2}x - \frac{3}{8}$.

   ## Answer

   $\frac{1}{12}y = \frac{1}{2}x - \frac{1}{6}x - \frac{3}{8}$. Solve for y. That will be a more graphable form of this linear equation.

   $\frac{1}{12}y = \frac{1}{3}x - \frac{3}{8}$.

   $y = 12\left(\frac{1}{3}x - \frac{3}{8}\right) = 4x - 4.5$.

   This graph is an increasing straight line with a rather steep slope and a y-intercept of $(0, -4.5)$.

   To find the coordinates of the x-intercept, set $y = 0$ and solve:

   $0 = 4x - 4.5$. $x = 4.5/4 = 9/8 = 1.125$. The point is at $(1.125, 0)$.

   This graph has points in the first, third, and fourth quadrants only.

2. $y = 2.4$.

   The graph is a horizontal line with y-intercept at $(0, 2.4)$, and it lies in quadrants I and II.

3. $y|x| = 2$.

   This is a hyperbola with points in the first and second quadrants, and asymptotes the positive and negative x-axes and the positive y-axis. There are no intercepts since neither x nor y can be 0. The graph is increasing in the second quadrant and decreasing in the first quadrant. It is concave up.

   Some points on the graph are: $(-10, 0.2)$, $(-4, 1/2)$, $(-1/8, 16)$, $(1/8, 16)$, $(4, 1/2)$, and $(10, 0.2)$.

   The y-axis is an axis of symmetry.

4. $y = \sqrt{x}$.

   This graph has an endpoint at the origin and points only in the first quadrant. It is concave down and always increasing. The shape is half of a parabola.

   Remember that over the real numbers a square root is only defined of a positive number. Also note that $\sqrt{\ }$ refers to the positive square root.

   Some points on the graph: $(1/25, 1/5)$, $(1, 1)$, $(9, 3)$, $(49, 7)$, $(100, 10)$, and $(1{,}000{,}000; 1{,}000)$.