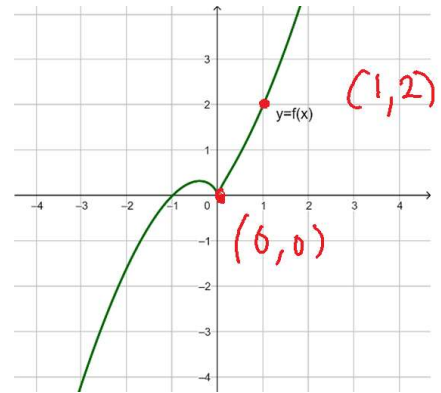
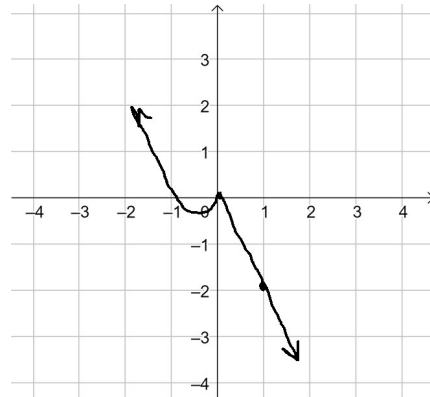


Math 146 extra problems:

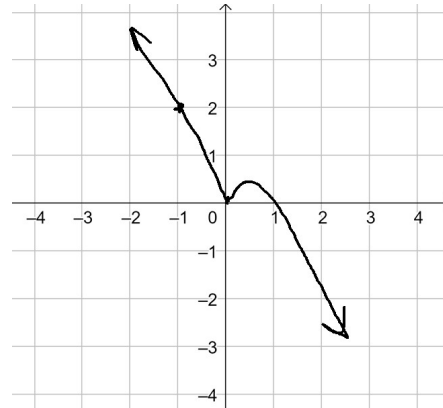
1. Given that the function $f(x)$ is shown, graph each of the following:



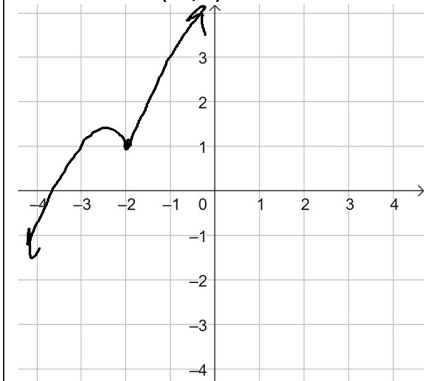
a. $y = -f(x)$ is an up-down reflection



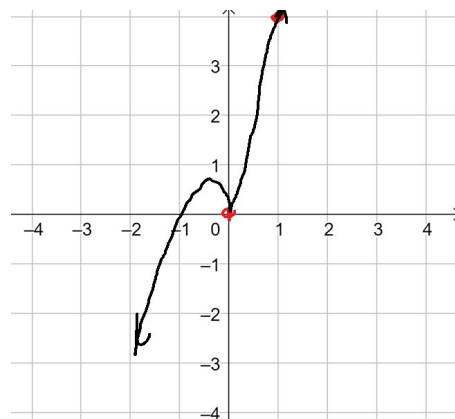
b. $y = f(-x)$ is a left-right reflection



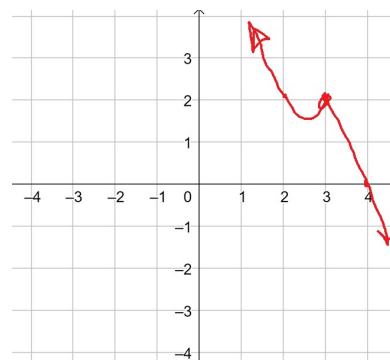
c. $y = f(x+2) + 1$ is a shift with new center $(-2,1)$



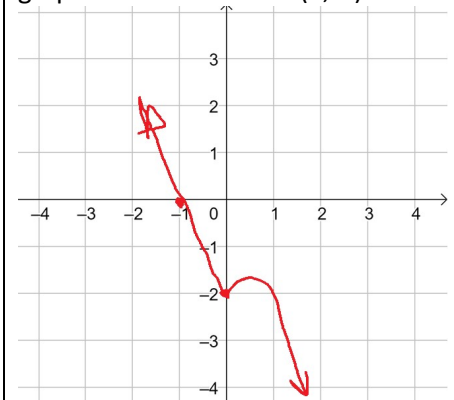
d. $y = 2f(x)$ stretch twice as high (twice as far from the x-axis)



e. $y = -f(x-3) + 2$ flip up-down and graph with new center $(3,2)$



f. $y = f(-x) - 2$ flip left right, and graph from new center $(0,-2)$



Solve each equation for x:

- Factor the denominators
- Multiply by the factors of the denominator
- Multiply out to get a polynomial
- Solve for x

$$2. \frac{x-4}{x^2+5x+6} = \frac{x-2}{x^2+4x+3} - \frac{5}{x^2+3x+2}$$

$$\frac{x-4}{x^2+5x+6} = \frac{x-2}{x^2+4x+3} - \frac{5}{x^2+3x+2}$$

$$\frac{x-4}{(x+2)(x+3)} = \frac{x-2}{(x+3)(x+1)} - \frac{5}{(x+2)(x+1)}$$

$$\frac{(x+2)(x+3)(x+1)}{1} \cdot \frac{x-4}{(x+2)(x+3)} = \frac{(x+2)(x+3)(x+1)}{1} \cdot \frac{x-2}{(x+3)(x+1)} - \frac{(x+2)(x+3)(x+1)}{1} \cdot \frac{5}{(x+2)(x+1)}$$

$$\frac{\cancel{(x+2)} \cancel{(x+3)} (x+1)}{1} \cdot \frac{x-4}{\cancel{(x+2)} \cancel{(x+3)}} = \frac{(x+2) \cancel{(x+3)} \cancel{(x+1)}}{1} \cdot \frac{x-2}{\cancel{(x+3)} \cancel{(x+1)}} - \frac{\cancel{(x+2)} (x+3) \cancel{(x+1)}}{1} \cdot \frac{5}{\cancel{(x+2)} \cancel{(x+1)}}$$

$$(x+1)(x-4) = (x+2)(x-2) - (x+3) \cdot 5$$

$$x^2 - 4x + x - 4 = x^2 - 2x + 2x - 4 - 5x - 15$$

$$\begin{array}{r} -x^2 \\ -3x - 4 \end{array} = \begin{array}{r} -x^2 \\ -5x - 19 \end{array}$$

$$2x = -15$$

$$x = -15/2$$

$$3. \frac{3x}{x^2+5x+6} + \frac{2}{x^2+x-2} = \frac{5x}{x^2+2x-3}$$

This problem and solution taken from:

https://www.mesacc.edu/~scotz47781/mat120/notes/rational/solving/solving_practice.html

$$\text{Step 1: } (x+2)(x+3)(x-1) \left(\frac{3x}{(x+2)(x+3)} + \frac{2}{(x-1)(x+2)} = \frac{5x}{(x-1)(x+3)} \right)$$

$$\text{Step 2: } 3x(x-1) + 2(x+3) = 5x(x+2)$$

$$3x^2 - 3x + 2x + 6 = 5x^2 + 10x$$

$$3x^2 - x + 6 = 5x^2 + 10x$$

$$\text{Step 3: } 0 = 2x^2 + 11x - 6$$

$$0 = (2x-1)(x+6)$$

$$2x-1=0 \text{ or } x+6=0$$

$$x = \frac{1}{2} \text{ or } x = -6$$

$$\text{Step 4: } x = \frac{1}{2} \text{ or } x = -6$$

$$4. \frac{5}{x^2-9} + \frac{x-1}{x^2+3x} = \frac{x+2}{x^2-3x}$$

$$\frac{5}{(x-3)(x+3)} + \frac{x-1}{x(x+3)} = \frac{x+2}{x(x-3)}$$

$$\frac{x(x+3)(x-3)}{1} \cdot \frac{5}{(x-3)(x+3)} + \frac{x(x+3)(x-3)}{1} \cdot \frac{x-1}{x(x+3)} = \frac{x(x+3)(x-3)}{1} \cdot \frac{x+2}{x(x-3)}$$

$$\frac{\cancel{x}(\cancel{x+3})(\cancel{x-3})}{1} \cdot \frac{5}{(\cancel{x-3})(\cancel{x+3})} + \frac{\cancel{x}(\cancel{x+3})(x-3)}{1} \cdot \frac{x-1}{\cancel{x}(x+3)} = \frac{\cancel{x}(\cancel{x+3})(\cancel{x-3})}{1} \cdot \frac{x+2}{\cancel{x}(\cancel{x-3})}$$

$$5x + (x-3)(x-1) = (x+3)(x+2)$$

$$5x + \underbrace{x^2}_{-x^2} - x - 3x + 3 = \underbrace{x^2}_{-x^2} + 2x + 3x + 6$$

$$x+3 = 5x+6$$

$$-4x = 3$$

$$x = -3/4$$