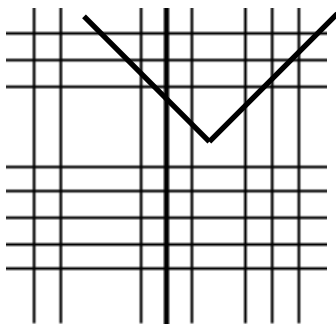


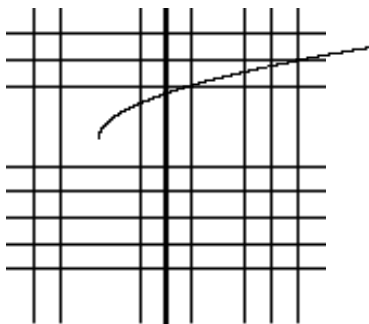
- Find the smallest value of b for which $4x^2 + bx - 70$ can be factored.
- An open box is made by cutting squares out of the corners of a piece of cardboard that is 15 inches by 30 inches. If the edge of each cut-out square is x inches,
 - Write an expression involving x , for the volume of the box.
 - What are the dimensions of the box with the maximum volume?
- Expand $(3x - 1)^6$.
- Find the perpendicular bisector of the line segment with endpoints $(2, 7)$ and $(-6, 5)$.
- Find the equation of the fourth degree polynomial that passes through the following points: $(-2, 0)$, $(-1, -40)$, $(0, 0)$, $(1, 0)$, and $(3, 0)$. Show your system of equations, all matrices, and write out the answer in correct form. Finally, write the polynomial in factored form.
- Solve the following inequalities. Show a number line analysis for each polynomial and rational inequality. Sketch a graph of each function on the graph paper provided and shade the solution to the inequality on the x -axis of the graph.
 - $(x - 4)(2x + 1)(x + 5) < 0$ Graph $y = (x - 4)(2x + 1)(x + 5)$
 - $|3x + 2| \geq 5$ Graph $y = |3x + 2|$
 - $\frac{x^2 - 9}{x + 2} \leq 0$ Graph $y = \frac{x^2 - 9}{x + 2}$
 - $3x^2 - 10x - 8 \geq 0$ Graph $y = 3x^2 - 10x - 8$
- Solve each of the following equations. Leave all solutions in exact form and in approximate form. Check each one with your calculator.
 - $\frac{5}{x^2 + 5x + 4} = \frac{2x}{x^2 - 1}$
 - $x^3 + 3x^2 = 4x$
 - $5^{2x} = 3^{x+2}$
 - $\log_4(x + 2) + \log_4(x + 4) = 3$
 - $\sqrt{2x + 1} + x = 5$
 - $|4x + 3| = 7$

8. Identify each of the following functions. Write them in correct function notation.

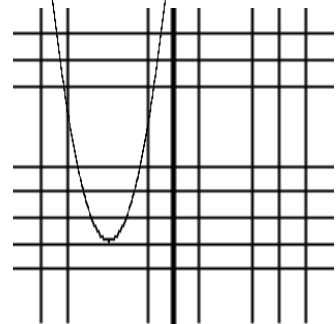
a)



b)



c)



9. Find the inverse of each of the following functions. Then show $(f \circ f^{-1})(x) = x$.

a) $f(x) = 5x - 9$

b) $f(x) = \frac{2x + 1}{x - 4}$

c) $f(x) = 7x^5 - 3$

d) $f(x) = \sqrt{4x - 2}$

10. For each of the following functions, simplify $\frac{f(x+h) - f(x)}{h}$

a) $f(x) = 5x^2 + 4x - 7$

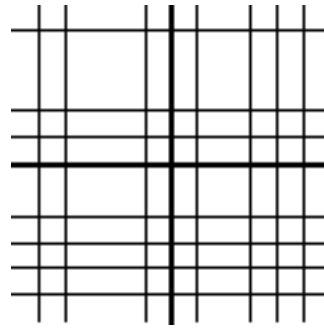
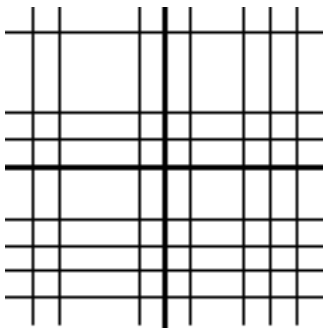
b) $f(x) = 3x^3 - 5x$

c) $f(x) = \frac{2x}{x+1}$

11. Sketch each of the following piecewise functions.

a) $f(x) = \begin{cases} 2x + 1 & x \leq 2 \\ (x - 3)^2 + 6 & x > 2 \end{cases}$

b) $f(x) = \begin{cases} 5 & x \leq -3 \\ |x + 2| - 1 & x > -3 \end{cases}$



12. The half-life of a certain substance is 3 years. If you start with 50 grams of the substance, when will there be only one gram left?

13. For the function $f(x) = \frac{3x(x-3)^3(x+4)(x-6)^2}{(x-4)^4(x+2)^2(x-1)}$

- a) Find all x and y-intercepts, tell whether x-intercepts cross the x-axis or not.
- b) Find all vertical asymptotes.
- c) Find the horizontal asymptote.

14. Sketch the graph of $f(x) = \frac{2x}{x-4}$. Remember to include all steps.

