

1. (5 points) Does the table below represent a function? Explain why or why not.

Input	π	-1	4	7	-1	0
Output	3	2	10^{43}	3	$\sqrt{\pi}$	0

2. (8 points) Recall that for a function f , the difference quotient is

$$\frac{f(x+h) - f(x)}{h}, \quad h \neq 0.$$

Find and simplify the difference quotient for the function $f(x) = 2x^2$.

3. (6 points) Determine if the function $f(x) = 2x^9 + 3x^3 - x$ is even, odd, or neither. Be sure to explain your answer!

4. (10 points) Let

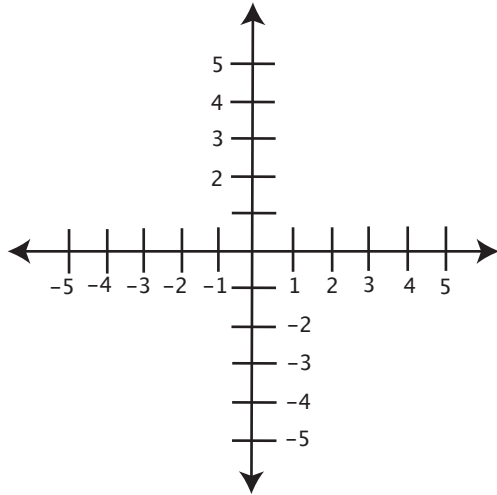
$$f(x) = x^2 + 2 \quad \text{and} \quad g(x) = 2\sqrt{x-2}.$$

(a) Find $(f \circ g)(x)$.

(b) Find the domain of $(f \circ g)(x)$.

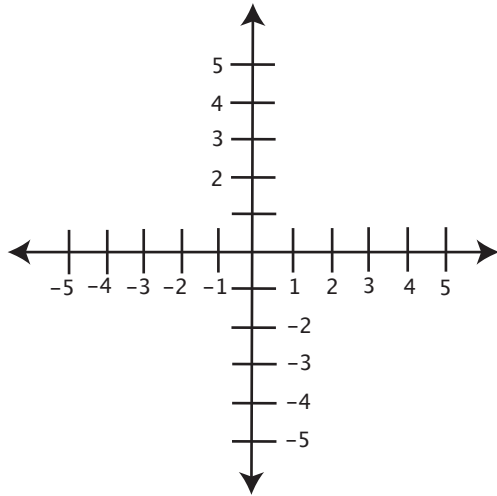
5. (16 points)

- (a) Write the rule (formula) for the function $g(x)$ that is described by the following: has the shape of parent function $f(x) = \sqrt{x}$, but vertically shifted up 1 unit, then horizontally shifted right two units, and finally reflected in the y -axis.
- (b) Sketch the graph of $g(x)$.

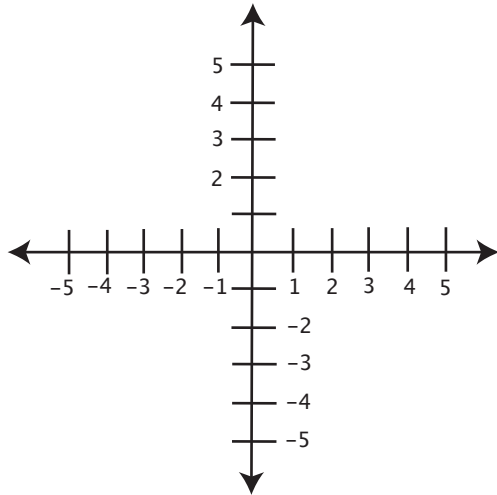


6. (10 points) Find the inverse function of $f(x) = \frac{3x + 5}{2x - 1}$.

7. (12 points) Consider the quadratic function $f(x) = -x^2 - 6x - 5$.
- Write this function in standard form.
 - Find the vertex and axis of symmetry.
 - Sketch the graph of f .



8. (16 points) Sketch the graph of the function $f(x) = \frac{1}{3}x(x - 4)^2$ by (a) applying the Leading Coefficient Test, (b) finding the zeroes of the polynomial, (c) plotting sufficient solution points, and (d) drawing a continuous curve through the points.



9. (10 points) Use long division to divide $3x^3 - 6x^2 + 2$ by $x + 2$. Write your answer in the form $q(x) + \frac{r(x)}{d(x)}$ for appropriate polynomial functions q , r , and d .
10. (7 points) Write the complex number $\frac{4+i}{1-2i}$ standard form (i.e., the form $a + bi$).