

Precalculus: Functions and Their Graphs - Homework

Student Name: _____

July 14, 2024

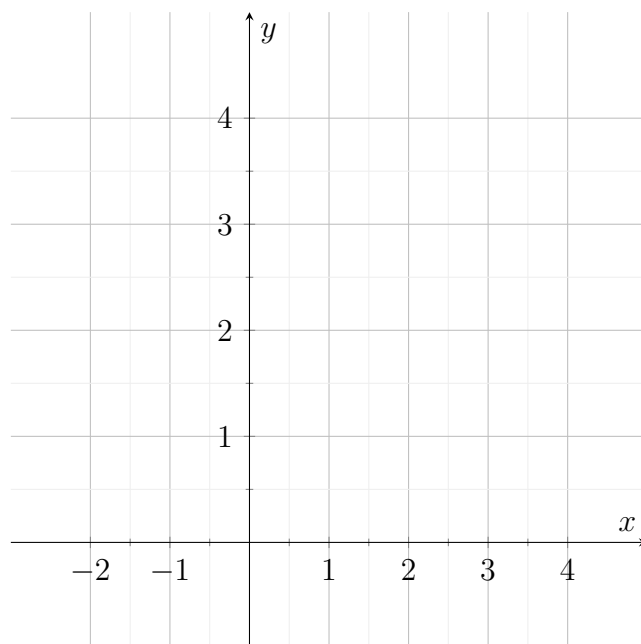
Instructions

Solve the following problems. Show all your work and explain your reasoning where appropriate. Use additional paper if needed.

1. Find the equation of the line passing through the points $(1, 4)$ and $(3, 8)$. Express your answer in slope-intercept form.

2. Given $f(x) = x^2 - 2x + 3$ and $g(x) = x + 1$, find:
 - (a) $(f \circ g)(x)$
 - (b) $(g \circ f)(x)$
 - (c) Evaluate $(f \circ g)(2)$

3. Starting with the function $f(x) = |x|$, graph $g(x) = |x - 1| + 2$. Describe all transformations applied to $f(x)$ to get $g(x)$.



4. Let $f(x) = x^2 + 1$ and $g(x) = 2x - 3$.

- (a) Find an expression for $(f + g)(x)$
- (b) Find an expression for $(f \cdot g)(x)$
- (c) Evaluate $(f + g)(3)$ and $(f \cdot g)(3)$

5. Find the inverse function for $f(x) = 3x + 4$. Then, find $f^{-1}(10)$.

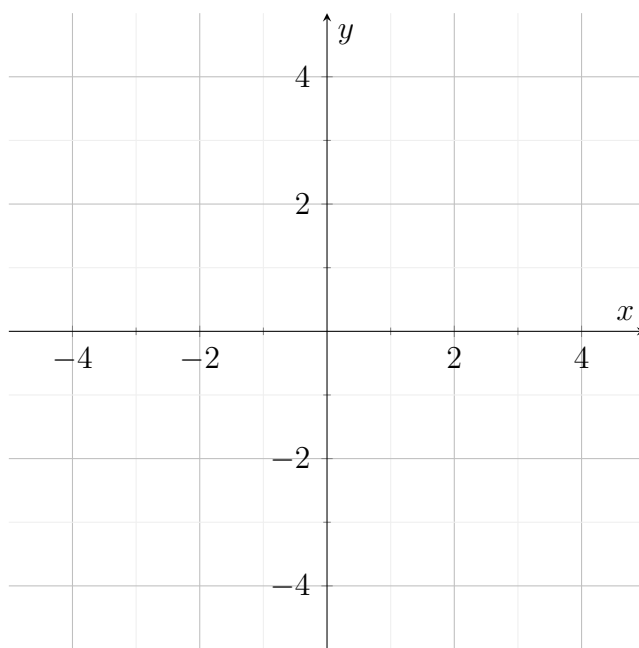
6. For the function $h(x) = x^2 - 4x - 5$:

- (a) Find the y-intercept

- (b) Find the x-intercepts
- (c) Find the vertex of the parabola
- (d) Is the parabola opening upward or downward?

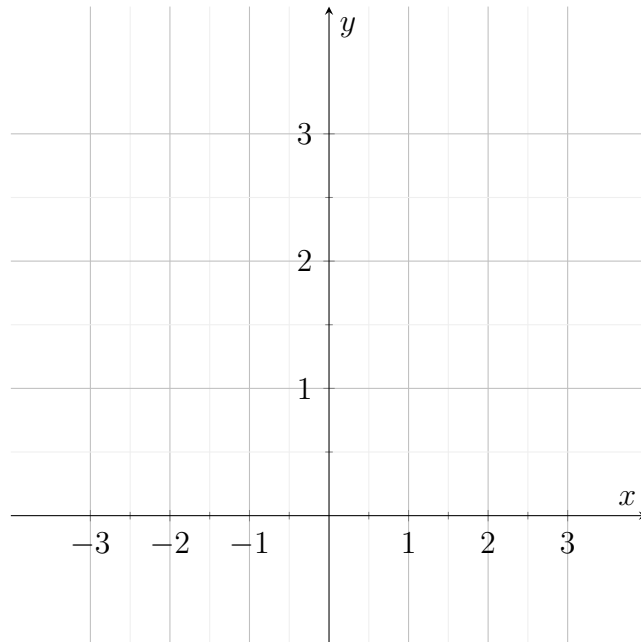
7. Given the function $f(x) = \frac{x+2}{x-1}$:

- (a) Find the domain of $f(x)$
- (b) Find any vertical and horizontal asymptotes
- (c) Sketch the graph of $f(x)$

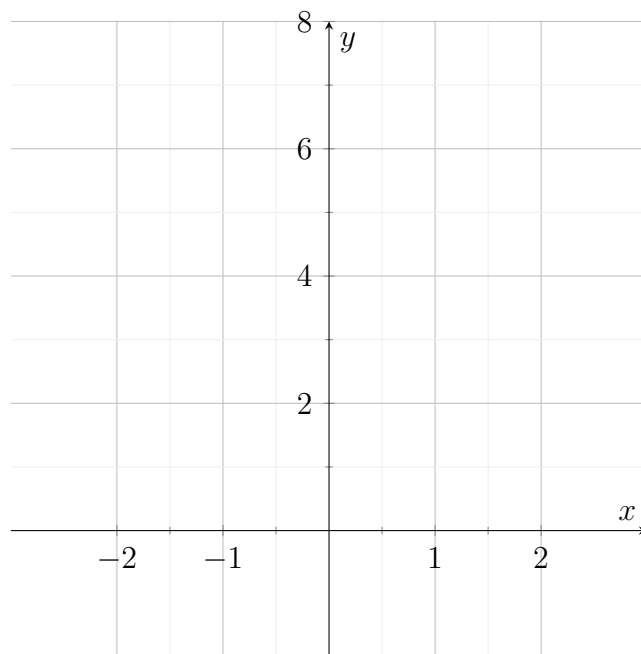


8. Determine if the function $f(x) = x^3 - x$ is one-to-one. Explain your reasoning.

9. Find the domain and range of the function $f(x) = \sqrt{x+2}$. Then, sketch its graph.



10. For the function $f(x) = 2^x$, find and graph $g(x) = 2^{x+1} - 1$. Describe all transformations applied to $f(x)$ to get $g(x)$.

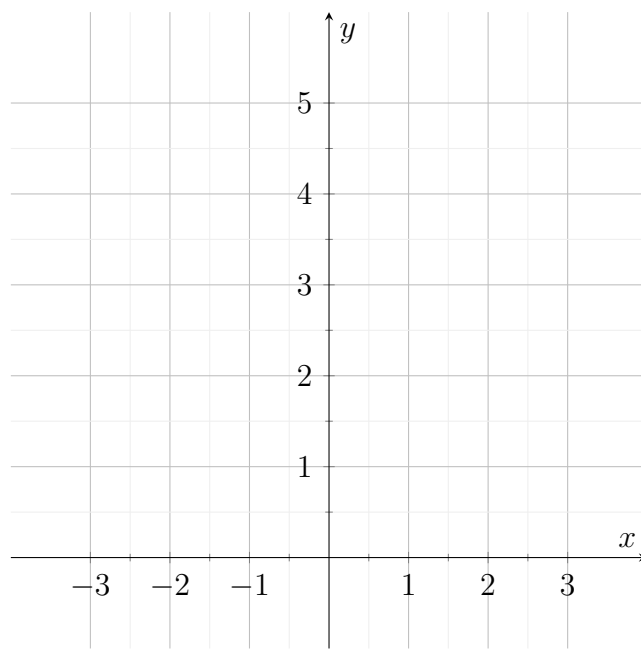


11. Solve the equation: $\log_2(x + 3) = 4$

12. Find the x-coordinate(s) of the point(s) where the graphs of $y = x^2 - 2x - 3$ and $y = 2x + 1$ intersect.

13. Given $f(x) = 3x - 1$ and $g(x) = \frac{x}{2} + 1$, find $(f \circ g)(x)$ and $(g \circ f)(x)$.

14. Sketch the graph of $y = |x^2 - 4|$. Identify any key features (intercepts, vertex, etc.).



15. For the function $f(x) = \frac{1}{x-2}$, describe how its graph relates to the graph of $y = \frac{1}{x}$. What transformations have been applied?