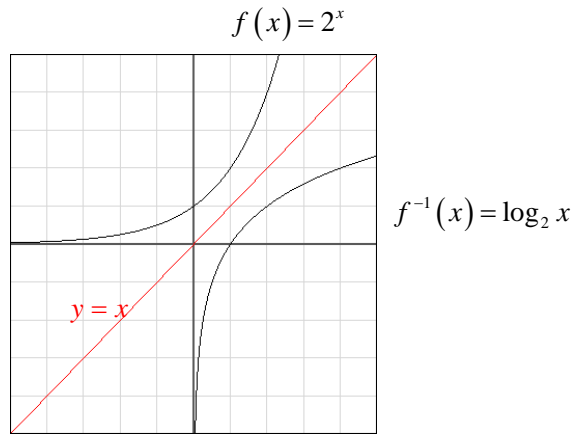
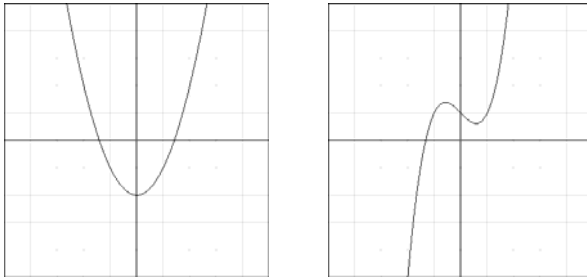


Inverse Functions

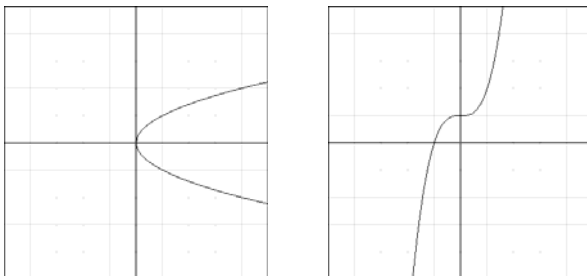


$$f(x) = 2^x$$

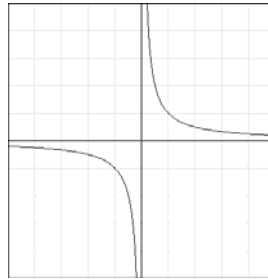
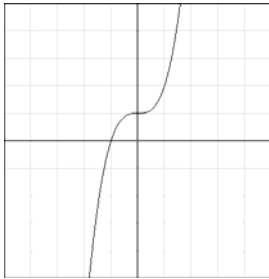
Vertical Line Test - Determines if the graph is a function.



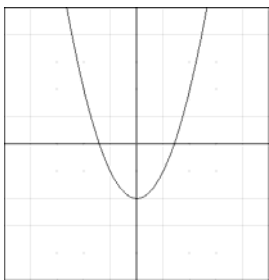
Horizontal Line Test - Determines if the function is one-to-one.



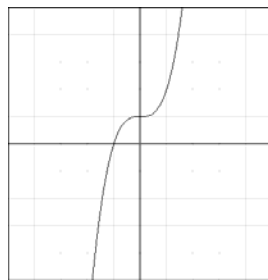
One-to-One Function - A graph that passes both the vertical and horizontal line tests. The graph is a function and it has an inverse.



Monotonic Function - A function that is always increasing or always decreasing.



$$f(x) = x^2 - 2$$



$$f(x) = x^3 + 1$$

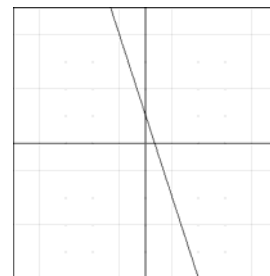
If $f(x)$ and $g(x)$ are inverse functions, then $f(g(x)) = g(f(x)) = x$.

$$f(x) = x^3$$

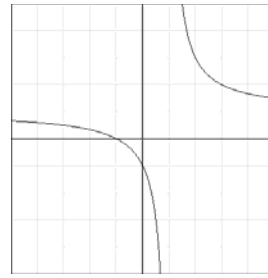
$$g(x) = \sqrt[3]{x}$$

Directions: For questions 1 through 7, determine if the function has an inverse.

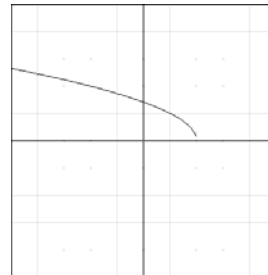
1. $f(x) = -3x + 1$



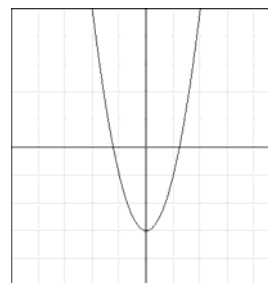
2. $f(x) = \frac{x+1}{x-1}$



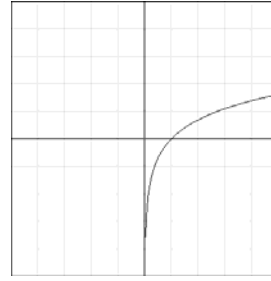
3. $f(x) = \sqrt{2-x}$



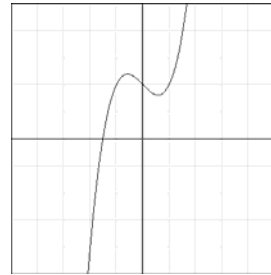
4. $f(x) = 2x^2 - 3$



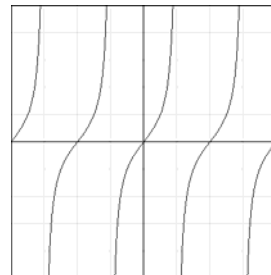
5. $f(x) = \ln x$



6. $f(x) = x^3 - x + 2$



7. $f(x) = \tan x$



Directions: For questions 8 through 12, find the inverse of each function.

8. $f(x) = -3x + 1$

9. $f(x) = \frac{3x+1}{2x-1}$

10. $f(x) = \sqrt{2-x}$

11. $f(x) = 2x^2 - 3, x \geq 0$

12. $f(x) = \ln x$

Directions: For question 13, show that the functions are inverses of each other.

13. $f(x) = \frac{1}{x-2} + 1$

$$g(x) = \frac{2x-1}{x-1}$$

Derivative of the Inverse Function: $(f^{-1})'(x) = \frac{1}{f'(g(x))}$

Steps to find the derivative of the inverse at $x = a$.

1. Set $f(x)$ equal to a and solve for x .
2. Find $f'(x)$ at the value of x found in step 1.
3. Take the reciprocal of the value found in step 2.

Directions: For questions 14 and 15, find $(f^{-1})'(a)$.

14. $f(x) = \frac{\ln e^{3x}}{x-1}$, $a = 2$

15. $f(x) = x^3 - x^2 + 2x + 2$, $a = 4$