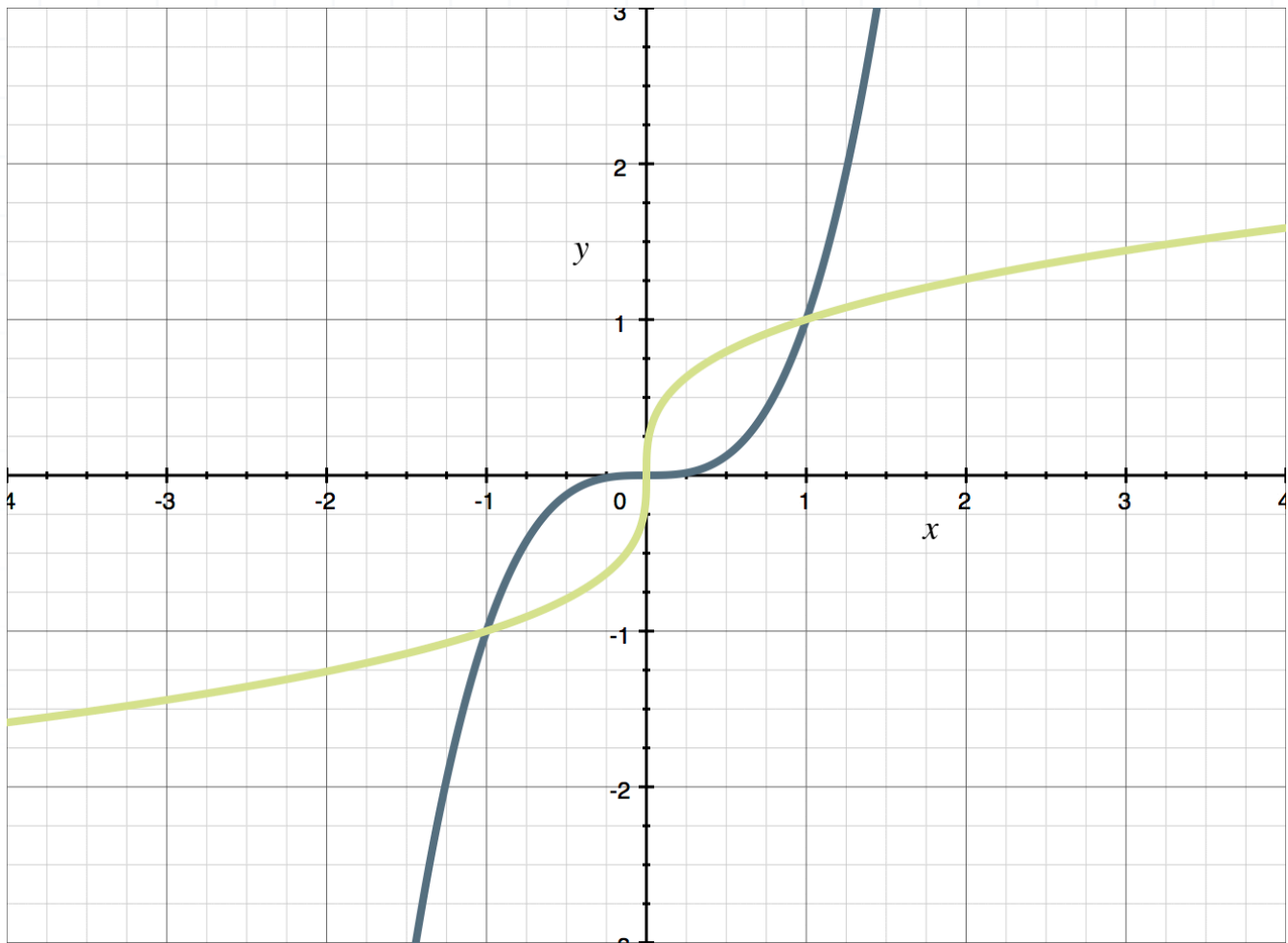


Topic: Inverse functions

**Question:** The blue curve is the graph of a function, and the green curve is the graph of its inverse. Which pair of functions do the graphs represent?



Answer choices:

- A

$f(x) = x^3$

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

$f(x) = x^3$

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

$f(x) = -x^3$

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

$f(x) = -x^3$

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



**Solution: B**

The point (1,1) is common to the two graphs, so let's input 1 into both functions in each pair and see if it returns 1 for both of them.

A             $f(1) = 1^3 = 1$              $g(1) = -\sqrt[3]{1} = -1$

B             $f(1) = 1^3 = 1$              $g(1) = \sqrt[3]{1} = 1$

C             $f(1) = -(1^3) = -1$              $g(1) = -\sqrt[3]{1} = -1$

D             $f(1) = -(1^3) = -1$              $g(1) = \sqrt[3]{1} = 1$

Look at answer choice B. Evaluating  $f(1)$  returns a value of 1. Likewise, evaluating  $g(1)$  also returns a value of 1. This tells us that (1,1) is a point of the graphs of the functions  $f(x)$  and  $g(x)$  that are defined in answer choice B.



**Topic:** Inverse functions

**Question:** Which of these functions is the inverse of the given function?

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

**Answer choices:**

A  $f^{-1}(x) = 2 - \frac{1}{x}$

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

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

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



**Solution: C**

To find the inverse of

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

first replace  $f(x)$  with  $y$ .

$$y = \frac{1}{x} - 2$$

Next, solve for  $x$ .

$$y + 2 = \frac{1}{x}$$

$$x(y + 2) = 1$$

$$x = \frac{1}{y + 2}$$

Now switch  $x$  with  $y$ .

$$y = \frac{1}{x + 2}$$

Finally, write the inverse function by replacing  $y$  with  $f^{-1}(x)$ .

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



**Topic:** Inverse functions

**Question:** Which of these is the inverse of the given function?

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

**Answer choices:**

A  $f^{-1}(x) = \sqrt[3]{\frac{3x}{4}}$

B  $f^{-1}(x) = \frac{\sqrt[3]{x}}{3} + 4$

C  $f^{-1}(x) = \sqrt[3]{3x + 4}$

D  $f^{-1}(x) = \sqrt[3]{\frac{x + 4}{3}}$



**Solution: D**

To find the inverse of  $f(x) = 3x^3 - 4$ , first replace  $f(x)$  with  $y$ .

$$y = 3x^3 - 4$$

$$y + 4 = 3x^3$$

$$\frac{y + 4}{3} = x^3$$

$$\sqrt[3]{\frac{y + 4}{3}} = x$$

Now switch  $x$  with  $y$ .

$$\sqrt[3]{\frac{x + 4}{3}} = y$$

Finally, write the inverse function by replacing  $y$  with  $f^{-1}(x)$  (and then turning the equation around so that  $f^{-1}(x)$  is on the left side).

$$f^{-1}(x) = \sqrt[3]{\frac{x + 4}{3}}$$

