

PreCalculus Review Lesson 2b

Function Inverses

Find $f^{-1}(x)$ if $f(x) = 2x^3 - 3$.

$$y = 2x^3 - 3$$

$$\begin{array}{r} X = 2y^3 - 3 \\ +3 \quad \quad +3 \\ \hline X+3 = 2y^3 \\ \frac{X+3}{2} = \frac{2y^3}{2} \\ \sqrt[3]{\frac{X+3}{2}} = \sqrt[3]{y^3} \\ f^{-1}(x) = \sqrt[3]{\frac{1}{2}x + \frac{3}{2}} \end{array}$$

Verify, using compositions, that f and g are inverse functions.

$$f(x) = \sqrt[3]{-8x-6}, \quad g(x) = \frac{x^3+6}{8}$$

$$\begin{aligned} f(g(x)) &= \sqrt[3]{-8\left(\frac{x^3+6}{8}\right)-6} \\ &= \sqrt[3]{x^3+6-6} \\ &= \sqrt[3]{x^3} = X \quad \checkmark \end{aligned}$$

$$\begin{aligned} g(f(x)) &= \frac{(\sqrt[3]{-8x-6})^3+6}{8} \\ &= \frac{-8x-6+6}{8} \\ &= \frac{-8x}{8} = -x \end{aligned}$$

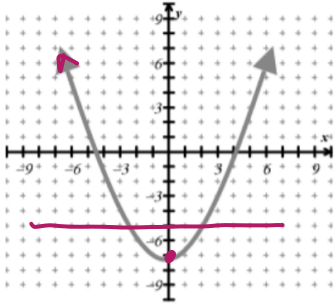
DEFINITION: one-to-one

Use the HORIZONTAL LINE TEST

to ensure that y -values do not repeat

$$= -\frac{-8x}{8} = \frac{8x}{8} = X \quad \checkmark$$

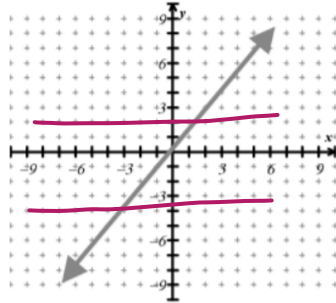
Determine if each function is one-to-one. Explain.



One-to-one: Yes or **No**

Domain: $(-\infty, \infty)$ Increase: $(0, \infty)$

Range: $[-7, \infty)$ Decrease: $(-\infty, 0)$



One-to-one: **Yes** or No

Domain: $(-\infty, \infty)$ Increase: $(-\infty, \infty)$

Range: $(-\infty, \infty)$ Decrease: none

Given the relation $\{(-2, 4), (-1, 1), (0, 4), (1, 5)\}$, answer the following questions.

Is the relation a function?

yes

One-to-one?

no

Make a table of the inverse coordinates.

x	y
4	-2
1	-1
4	0
5	1

Is this relation a function?

no