

3.7 Inverse Functions

Inverse of $f(x)$

- denoted: $f^{-1}(x)$
- switch x & y in the equation, and solve for y
- $f(f^{-1}(x)) = x$, and $f^{-1}(f(x)) = x$

ex1) $f(x) = 2x - 7$, find $f^{-1}(x)$ and check

$$y = 2x - 7$$

$$x = 2y - 7$$

$$y = \frac{x+7}{2}$$

$$f^{-1}(x) = \frac{x+7}{2}$$

$$f \circ f^{-1} = 2\left(\frac{x+7}{2}\right) - 7 = x+7-7 = x$$

2) $g(x) = 3x^2 + 7$ Find inverse & check

$$y = 3x^2 + 7$$

$$x = 3y^2 + 7$$

$$\frac{x-7}{3} = y^2$$

$$y = \pm \sqrt{\frac{x-7}{3}}$$

$$g \left(\pm \sqrt{\frac{x-7}{3}} \right) = 3 \left(\pm \sqrt{\frac{x-7}{3}} \right)^2 + 7 = x-7+7 = x$$

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ex) $h(x) = 5\sqrt[3]{2x} - 1$
Find Inverse and check

$$x = 5\sqrt[3]{2y} - 1$$

$$\frac{x+1}{5} = \sqrt[3]{2y}$$

$$\left(\frac{x+1}{5}\right)^3 = 2y$$

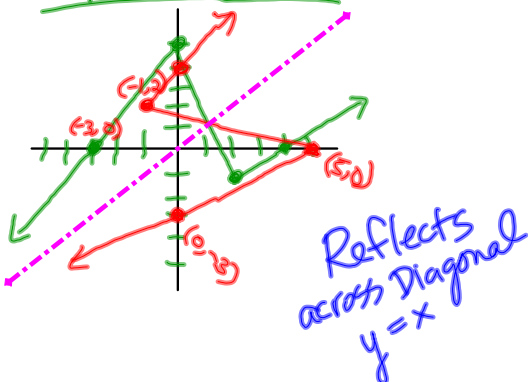
$$y = \left(\frac{x+1}{5}\right)^3 \cdot \frac{1}{2}$$

$$f^{-1}(x) = \left(\frac{x+1}{5}\right)^3 \cdot \frac{1}{2}$$

$$f^{-1} \circ f = \left(\frac{5\sqrt[3]{2x} - 1 + 1}{5}\right)^3 \cdot \frac{1}{2} = \left(\sqrt[3]{2x}\right)^3 \cdot \frac{1}{2} = 2x \cdot \frac{1}{2} = x$$

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Graph the Inverse



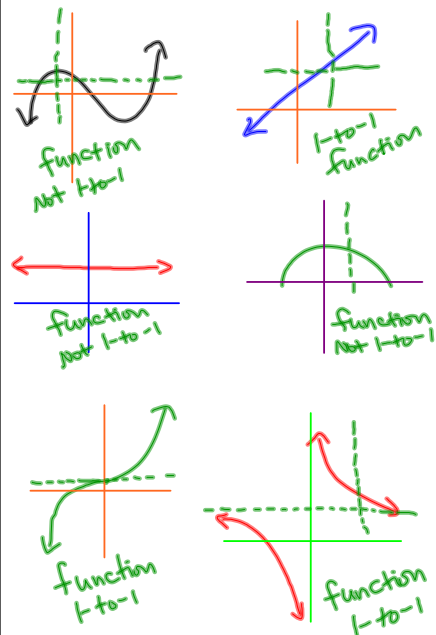
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One-to-One Functions

-- each x is paired with exactly one y , and each y is paired with exactly one x .

-- the inverse is also a function.

-- pass the **function** and **1-to-1** tests:
= any vert. or horiz. line can touch the graph no more than once.



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p 193 # 2-24 even, 32-36 even

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