Warm Up

Warm-Up 2.7.1

Ari received $100 as a birthday gift and has decided to save this money as well as add $20 of his own money each month. The total money Ari has saved can be estimated using the equation $y = 20x + 100$, where x is the number of months and y is the total amount of money saved.

$y - 100 = 20x$

$x = \frac{y-100}{20}$

1. How much money will Ari have saved after 6 months?

$y = 20(6) + 100 = \$220$

2. How long will it take Ari to save $400?

$400 = 20x + 100 \rightarrow 20x = 300 \rightarrow x = 15$ months

3. Suppose Ari decided to save $50 each month. The amount of money in his savings account after x months can now be estimated using the equation $y = 50x + 100$. How long will it take Ari to save $400 with his new savings plan?

$400 = 50x + 100$

$\rightarrow x = 6$ months

Objective: SWBAT find inverses of functions

Agenda:

- Warmup
- Notes
- Problem Task
- Practice: pg. 70 #13-35 odd
- Reflection

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Notes: Finding Inverse Functions

1. Switch the x and y
2. Solve for y

ex) $y = 4x^2 + 5$

$y = x^2 + 4x + 5$

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

$x = 4y^2 + 5$

$x - 5 = 4y^2$

$\frac{x-5}{4} = y^2$ → $y = \frac{\pm\sqrt{x-5}}{2}$

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

$x = 3y^2 - 3$

$x + 3 = 3y^2$

$y^2 = \frac{x+3}{3}$ → $y = \pm\sqrt{\frac{x+3}{3}}$

Restrictions on Domain

When you find the inverse of a function, can you always substitute any value for x? no

Try finding the inverse of $y = x^2$ → $y = \pm\sqrt{x}$

What values can we not use for x? negatives

Lana is driving home from her friend's house. She is driving at a steady speed, and her distance from her home, in miles, can be represented by the function f(x) = -40x + 15, where x is her driving time in hours. Find the inverse function $f^{-1}(x)$ to show when, in hours, Lana will be x miles from home.

$y = -40x + 15$

$x = -40y + 15$

$-15 \quad -15$

$\frac{x-15}{-40} = \frac{-40y}{-40}$

$f^{-1}(x) = \frac{x-15}{-40}$

or

$f^{-1}(x) = \frac{15-x}{40}$

ased Task 2.7.1: Falling Keys

er keys from a third-story window to a friend standing on the sidewalk. The distance eys and the ground, in feet, can be represented by the function $f(x) = -16x^2 + 32$, where seconds. Piper would like to be able to determine the time, in seconds, at which the keys n distance from the ground. What is the function with height in feet from the ground as ent variable? After about how many seconds were the keys 4 feet above the ground?

$y = -16x^2 + 32$

$x = -16y^2 + 32$

$x - 32 = -16y^2$

$y^2 = \frac{x-32}{-16}$

$y^2 = \frac{-x}{16} + 2$

$y = \sqrt{\frac{-x}{16} + 2}$

$y = \sqrt{\frac{-4}{16} + 2} \approx 1.32\text{s}$

The function $C(x) = \frac{2.50x + 1.00}{x}$ models the cost per item for a company to produce x items after the first item is made. What is the inverse function of $C(x)$?

$y = \frac{2.5x + 1}{x} \rightarrow x = \frac{2.5y + 1}{y}$

$xy = 2.5y + 1$

$-2.5y \quad -2.5y$

$xy - 2.5y = 1$

$y(x - 2.5) = 1 \rightarrow y = \frac{1}{x - 2.5}$

$C^{-1}(x) = \frac{1}{x - 2.5}$

Practice

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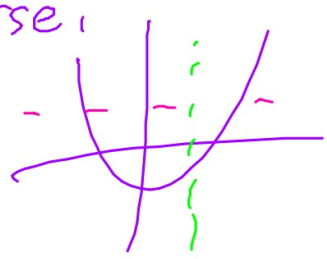
does it have an inverse? horizontal line test



Reflection

Why is the inverse not guaranteed to be a function?