

5-11. Solve the following equations, if possible. Some you can solve exactly, others approximately. If a solution is not possible, explain how you know. [Homework Help](#)

$$27 = 3^3 \quad 81 = 3^4$$

a. $1^x = 5$ **No Solution.**

b. $\sqrt{27^x} = 81$ **$x = \frac{8}{3}$**

c. $2^x = 9$ **$x \approx 3.17$**

d. $25^{(x+1)} = 125^x$ **$x = 2$**

e. $8^x = 2^5 \cdot 4^4$ **$x = \frac{13}{3}$**

$$5^2 = 25 \quad 5^3 = 125$$

a. $1^x = 5$

b. $\sqrt{27^x} = 81$

c. $2^x = 9$

d. $25^{(x+1)} = 125^x$ **$x = 2$**

$$1^2 = 1$$

$$27^{\frac{x}{2}} = 81$$

$$2^3 = 8$$

$$1^3 = 1$$

$$(3^3)^{\frac{x}{2}} = 3^4$$

$$2^{3.17} \approx 9.0005$$

$$(5^2)^{x+1} = (5^3)^x$$

$$1^{-2} = \frac{1}{1^2} = 1$$

$$3^{\frac{3x}{2}} = 3^4$$

estimate

$$5^{2x+2} = 5^{3x}$$

$$8^x = 2^5 \cdot 4^4$$

$$(2^3)^x = 2^5 \cdot (2^2)^4$$

$$2^{3x} = 2^5 \cdot 2^8$$

$$2^{3x} = 2^{13}$$

$$\frac{3x}{2} = 4$$

$$\begin{array}{r} 2x+2 = 3x \\ -2x \quad -2x \\ 2 = x \end{array}$$

$$3x = 13$$

$$x = \frac{13}{3}$$

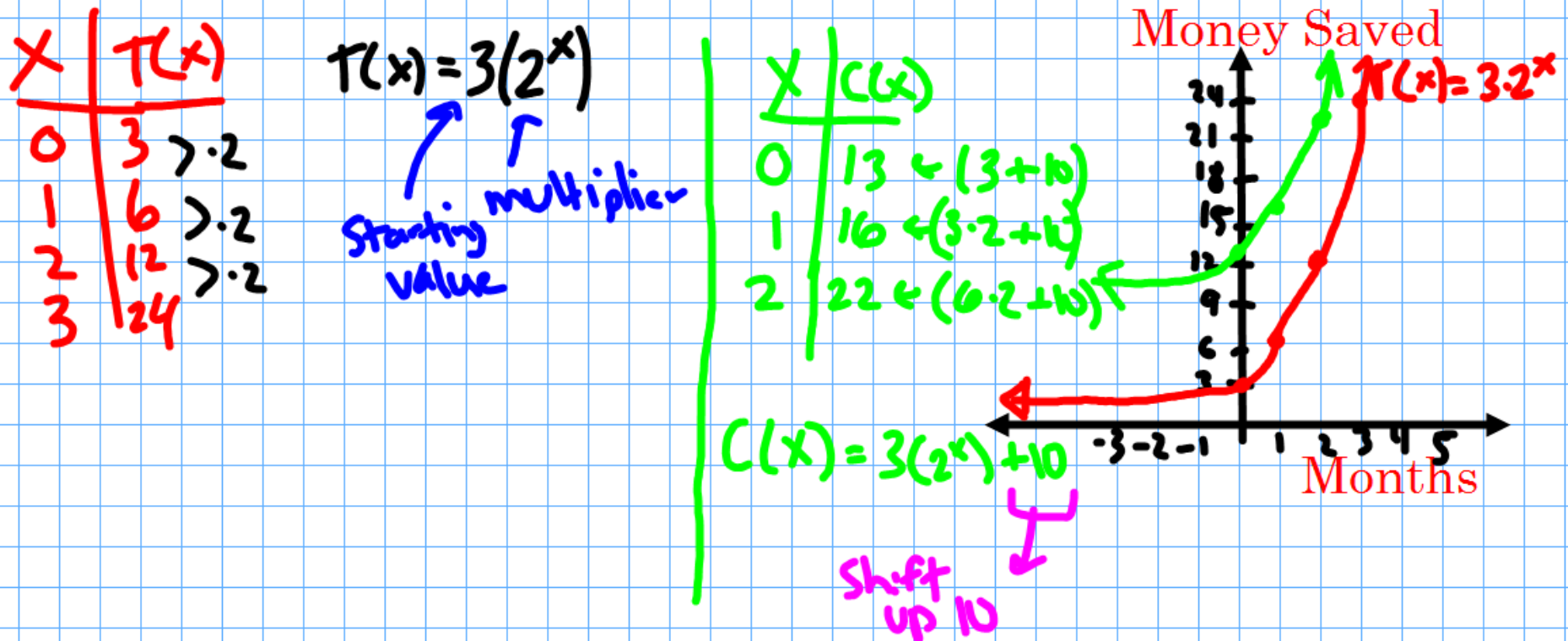
$$x = \frac{8}{3}$$

5-12. Tasha only has \$3 saved but has a goal of doubling the total amount of money she has saved every month. [Homework Help](#)

- a. Write an equation for the total amount of money Tasha has saved after x months.
- b. Tasha's brother Clifton is going to copy Tasha's savings plan exactly, but because he wants to always have more money than her, so he has \$10 saved and hiding in his dresser.

Write an equation for the total amount of money Clifton has saved after x months.

- c. Graph each situation on the same set of axes. How do the graphs of the two equations compare?



5-26. Write the equation of the inverse for each of the following functions.

a. $f(x) = 3x - 8$

$$f^{-1}(x) = \frac{x+8}{3}$$

b. $f(x) = \frac{1}{2}x + 6$

$$f^{-1}(x) = \frac{x-6}{\frac{1}{2}} = 2(x-6)$$

c. $f(x) = \frac{x+6}{2}$

$$f^{-1}(x) = 2x - 6$$

a) $f(3) = 3(3) - 8$
 $\begin{array}{r} 3 \cdot 3 \\ - 8 \\ \hline \end{array}$

$$f^{-1}(x) = \frac{x+8}{3}$$

$$\begin{array}{r} | \\ +8 \\ \div 3 \\ \hline 3 \end{array}$$

b. $\begin{array}{r} \cdot \frac{1}{2} \\ +6 \end{array}$

5-28. Solve the following systems of equations. In other words, find values of a and b that make each system true. Be sure to show your work or explain your thinking clearly. [Homework Help](#)

a. $3 = a \cdot b^0 \rightarrow 3 = a \cdot 1 \rightarrow 3 = a$

$75 = a \cdot b^2$

$75 = 3 \cdot b^2$

divide by 3

$25 = b^2$

$\sqrt{25} = |b|$

$b = 5$

$b = -5$

Check: $x^0 = 1$

$3 = \sqrt{3} \cdot 5^0$

$3 = 3 \cdot (-5)^0$

$75 = \sqrt{3} \cdot 5^2$

$75 = 3 \cdot (-5)^2$

b. $18 = a \cdot b^2$

$54 = a \cdot b^3$

$\frac{18}{b^2} = \frac{a \cdot b^2}{b^2}$

$\frac{18}{b^2} = a$

$18 = a \cdot (3)^2$

$18 = 9a$

$2 = a$

$54 = \frac{18}{b^2} \cdot b^3$

$\frac{b \cdot b \cdot b}{b \cdot b}$

$54 = 18 \cdot b$

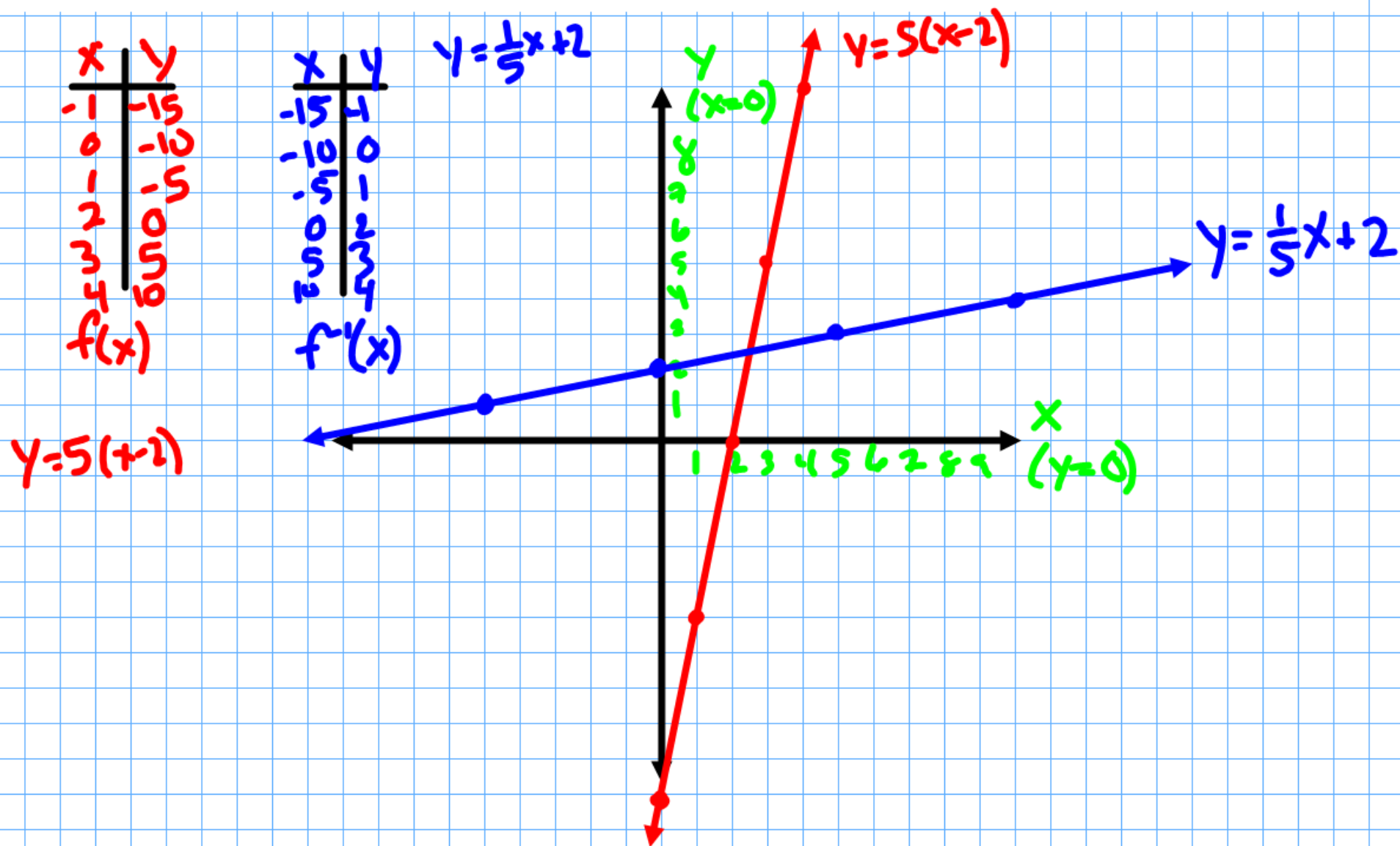
$3 = b$

Check:

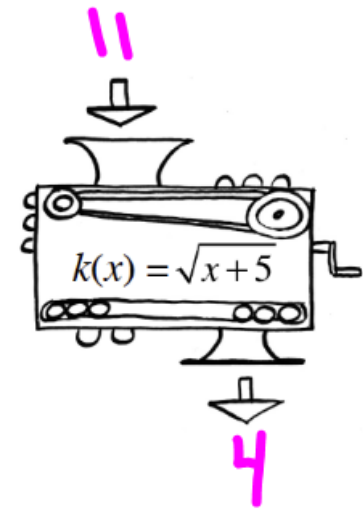
$18 = 2 \cdot 3^2$

$54 = 2 \cdot 3^3$

5-32. Graph $y = 5(x - 2)$ and its inverse on the same set of axes. Label the graph and the inverse function with their equations. [Homework Help](#)



5-48. Kirsta was working with the function machine shown at right, but when she turned her back, her little brother Caleb dropped in a number. She did not see what he dropped in, but she did see what fell out: 9. [Homework Help](#)



a. What operations must she perform on 9 to undo what her machine did? Use this to determine what number Caleb dropped in.

b. Write an equation for a machine that will undo Kirsta's machine.

$$k(x) = \sqrt{x+5}$$

a. $k(x) = 9$

$$9 = \sqrt{x+5}$$

Inverse:

① Square

② Subtract 5

$$x = 9^2 - 5$$

$$x = 76$$

$$k^{-1}(x) = x^2 - 5$$

$k(x)$

① add 5

② square root

Check:

$$k^{-1}(k(x)) = x$$

$$k^{-1}(k(11)) = 11$$

$$k^{-1}(4)$$

$$11$$

5-51. Graph the system below.

$$1 + x - y \geq 3x - 2y - 4$$

$$1 + x - y \geq 3x - 2y - 4$$

$$y < 2x^2 + 1$$

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

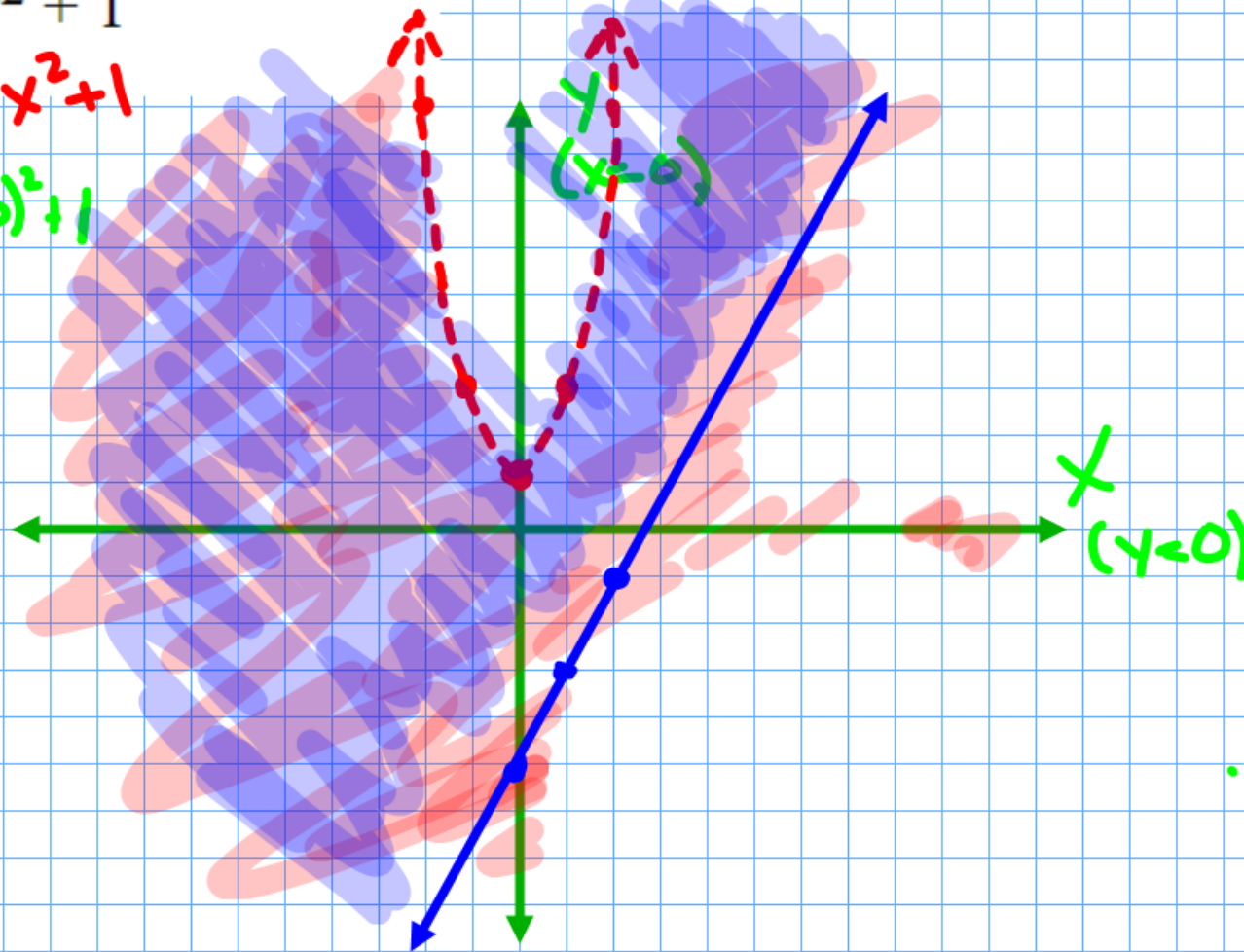
$$0 < 2(0)^2 + 1$$

$$0 < 1$$

$$1 + x - y = 3x - 2y - 4$$

$$-1 - x + 2y = -x + 2y - 1$$

$$y = 2x - 5$$



5-59. Sketch the graph of $y + 3 = 2^x$. [Homework Help](#)

$$y = 2^x - 3$$

a. What are the domain and range of this function?

b. Does this function have a line of symmetry? If so, what is it?

c. What are the x- and y-intercepts?

d. Sketch the inverse of this function on the same set of axes. What are the domain, range, and x- and y-intercepts of the inverse?

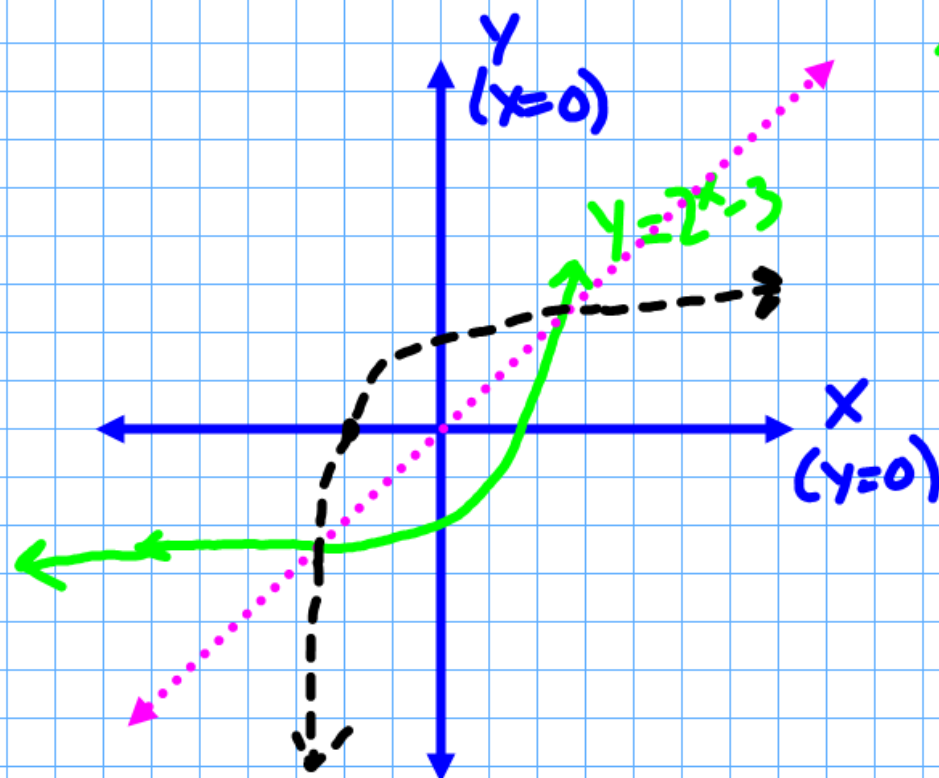
$$\text{x-int: } (1.585, 0)$$

No.

$$0 = 2^x - 3$$

$$2^x = 3$$

$$\text{y-int: } (0, -2)$$



$$D: -\infty < x < \infty$$

$$R: y > -3$$

Inverse:

$$D: x > -3$$

$$R: -\infty < y < \infty$$

$$\text{x-int: } (-2, 0)$$

$$\text{y-int: } (0, 1.585)$$

5-68. Let $y = \log_2(x)$. Rewrite the equation so that it begins with $x =$. Think about the definition of $y = \log_2(x)$ if you get stuck. Do the two equations look the same? Do the two equations mean the same thing? Are they equivalent? How do you know? This is very important. Think about it, and write a clear explanation. [Homework Help](#)

Examples:

$$\log_2(4) = 2$$

$$2^2 = 4$$

$$\log_2(8) = 3$$

$$2^3 = 8$$

$$\log_2(32) = 5$$

$$2^5 = 32$$

$$\log_2(128) = 7$$

$$2^7 = 128$$

$$\log_2(1) = 0$$

$$2^0 = 1$$

$$\log_2\left(\frac{1}{2}\right) = -1$$

$$2^{-1} = \frac{1}{2}$$

$$\log_2(x) = y$$

$$x =$$