

<p>1. Sketch the graph of the inverse of the following relation.</p> <p>Is the inverse a function?</p> <p style="text-align: center; color: blue;">no!</p>	<p>2. Sketch the graph of the inverse of the following relation.</p> <p>Is the inverse a function?</p> <p style="text-align: center; color: blue;">yes</p>	<p>3. Sketch the graph of the inverse of the following relation.</p> <p>Is the inverse a function?</p> <p style="text-align: center; color: blue;">yes</p>
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Match each relation with its inverse.

- | | |
|---|---|
| <p>_____ 4. $y = x^2 - 6x + 8$ omit</p> | <p>A. $y = \frac{x+6}{7}$</p> |
| <p>_____ 5. $y = x^3$ $\sqrt[3]{x} = y$</p> | <p>B. $y = \sqrt{x}$</p> |
| <p>_____ 5. $y = 3^x$ omit</p> | <p>C. $y = \log_3 x$</p> |
| <p>_____ 5. $y = 6x - 7$ $\frac{x+7}{6} = y$</p> | <p>D. $y = 3 \pm \sqrt{x+1}$</p> |
| <p>_____ 6. $y = 7x - 6$ $\frac{x+6}{7} = y$</p> | <p>E. $y = (x-2)^2$</p> |
| <p>_____ 7. $y = 2 \pm \sqrt{x}$ $(x-2) = \pm \sqrt{y}$
$(x-2)^2 = y$</p> | <p>F. $y = \pm \frac{1}{3} \sqrt{x+7}$</p> |
| <p>_____ 8. $y = 9x^2 - 7$ $\pm \sqrt{\frac{x+7}{9}} = y$
$\pm \frac{\sqrt{x+7}}{3} = y$</p> | <p>G. $y = \frac{x+7}{6}$</p> |

Find the inverse:

9) $y = \frac{2x-3}{x+7}$

$$\frac{x}{1} = \frac{2y-3}{y+7}$$

$$x(y+7) = 2y-3$$

$$xy + 7x = 2y-3$$

$$7x+3 = 2y-xy$$

$$7x+3 = y(2-x)$$

$$\frac{7x+3}{2-x} = y^{-1}$$

10.) $y = (2x-3)^2 - 7$

$$x = (2y-3)^2 - 7$$

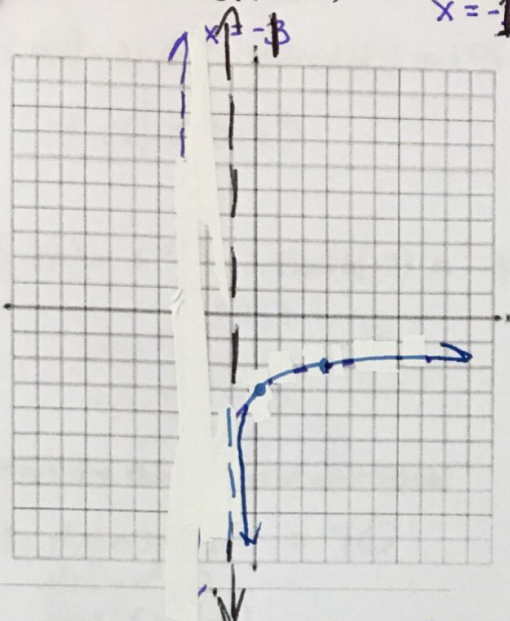
$$x+7 = (2y-3)^2$$

$$\pm \sqrt{x+7} = 2y-3$$

$$y^{-1} = \frac{3 \pm \sqrt{x+7}}{2}$$

Graph: 9) $y = \log_4(x + 1) - 3$

$(1,0)$ $(0,0)$ $(0,-3)$
 $(4,4)$ $(\frac{8}{3}, 1)$ $(3,-2)$
 $x = -1$



Important points: $(0,-3)$ $(3,-2)$

Domain: $(-1, \infty)$

Range: $(-\infty, \infty)$

Increasing: $(-1, \infty)$

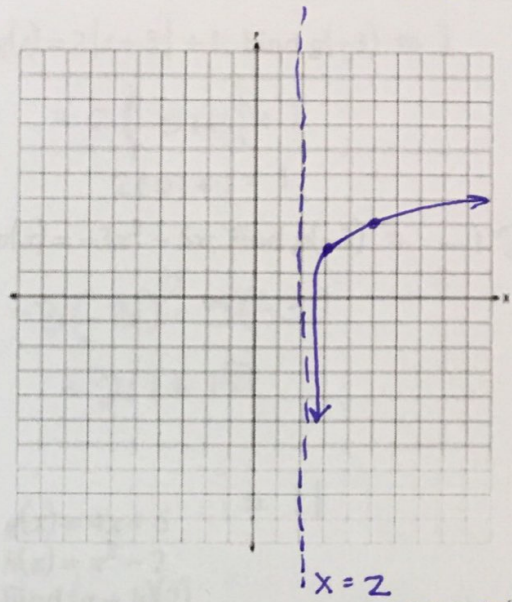
Decreasing: never

End behavior: $\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow -1^-} f(x) = -\infty$

Asymptotes: $x = -1$

10) $y = \log_3(x - 2) + 2$

$(1,0)$ $(3,0)$ $(3,2)$
 $(3,1)$ $(5,1)$ $(5,3)$
 $x = 2$



Important Points: $(3,2)$ $(5,3)$

Domain: $(2, \infty)$

Range: $(-\infty, \infty)$

Increasing: $(2, \infty)$

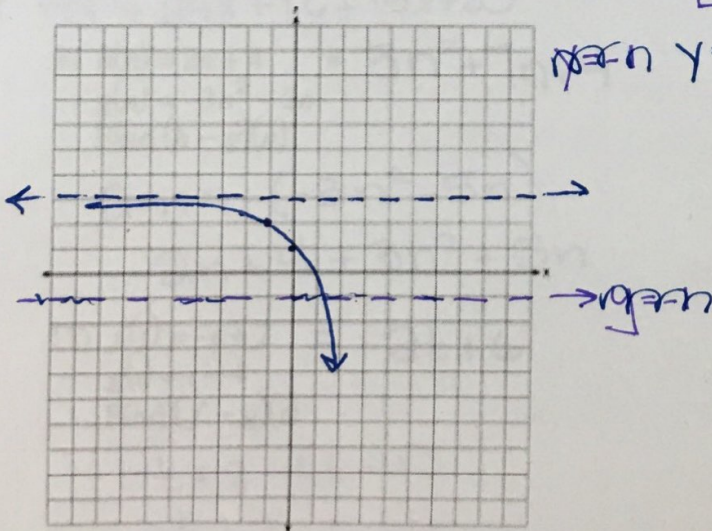
Decreasing: never

End behavior: $\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow 2^+} f(x) = -\infty$

Asymptotes: $x = 2$

Graph: 11) $y = -2^{x+1} + 3$

$(0,1)$ $(0,-1)$ $(-1, 2)$
 $(1,2)$ $(1,-2)$ $(0, 1)$



Important Points: $(-1, 2)$ $(0, 1)$

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

Range: $(-\infty, 3)$

Increasing: never

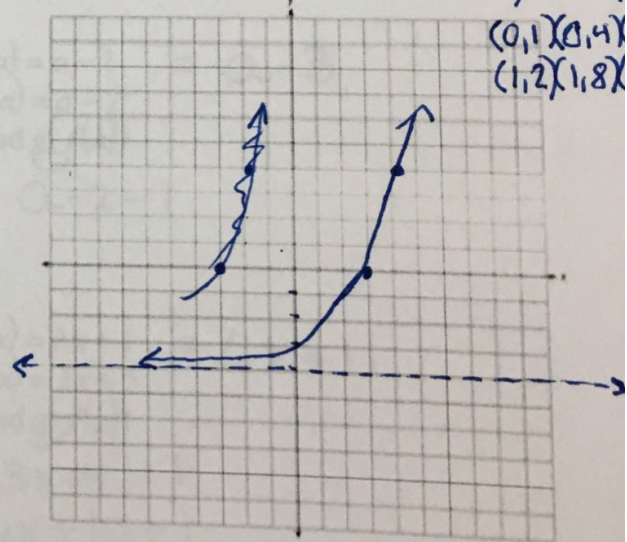
Decreasing: $(-\infty, \infty)$

End behavior: $\lim_{x \rightarrow \infty} f(x) = -\infty$ $\lim_{x \rightarrow -\infty} f(x) = 3$

Asymptotes: $y = 3$

12) $y = 4(2)^{x-3} - 4$

$y = -4$
 $(0,1)$ $(0,4)$
 $(1,2)$ $(1,8)$



Important Points: $(3,0)$ $(4,4)$

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

Range: $(-4, \infty)$

Increasing: $(-\infty, \infty)$

Decreasing: never

End behavior: $\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow -\infty} f(x) = -4$

Asymptotes: $y = -4$

Evaluate each function.

$$1) h(x) = 3|-2x| + 3; \text{ Find } h(2) = 15$$

$$= 3|-2(2)| + 3$$

$$3) h(x) = -5^{-x+1} - 3; \text{ Find } h(-2) = -128$$

$$-1.5^{-(-2)+1} - 3$$

$$-1.5^3 - 3$$

$$-12.5 - 3$$

$$2) g(t) = 2|t+3| + 1; \text{ Find } g(-3) = 1$$

$$= 2|-3+3| + 1$$

$$2(0) + 1 = 1$$

$$4) p(x) = -3x^2 - 5x; \text{ Find } p(-3) = -12$$

$$-3(-3)^2 - 5(-3)$$

$$-27 + 15$$

Perform the indicated operation.

$$5) f(n) = 3n + 1 = 70$$

$$g(n) = n^2 - 2$$

$$\text{Find } (f \circ g)(-5)$$

$$3(n^2 - 2) + 1$$

$$3(5^2 - 2) + 1$$

$$3(25 - 2) + 1$$

$$7) g(x) = x^2 + 5x = 9x^2 + 39x + 36$$

$$f(x) = 3x + 4$$

$$\text{Find } g(f(x))$$

$$(3x+4)^2 + 5(3x+4)$$

$$9x^2 + 24x + 16 + 15x + 20$$

$$9) h(n) = 2n + 4 = 3n^2 + 7n + 4$$

$$g(n) = -3n^2 - 5n$$

$$\text{Find } (h - g)(n)$$

$$2n + 4 - (-3n^2 - 5n)$$

$$2n + 4 + 3n^2 + 5n$$

$$11) f(t) = -t + 2 = -2t + 6$$

$$g(t) = t - 4$$

$$\text{Find } (f - g)(t)$$

$$-t + 2 - (t - 4)$$

$$-t + 2 - t + 4$$

$$13) h(x) = 4x + 4 = 2x + 2$$

$$g(x) = 2x + 2$$

$$\text{Find } h(x) - g(x)$$

$$4x + 4 - (2x + 2)$$

$$4x + 4 - 2x - 2$$

$$6) g(x) = 4x + 5 = 11$$

$$h(x) = x^2 - 2$$

$$\text{Find } (g - h)(2)$$

$$4x + 5 - (x^2 - 2)$$

$$4(2) + 5 - (2)^2 + 2$$

$$8) g(a) = -2a^3 - 3a = -2a^3 - a - 5$$

$$h(a) = 2a - 5$$

$$\text{Find } (g + h)(a)$$

$$-2a^3 - 3a + 2a - 5$$

$$10) g(a) = a - 1 = a - 3$$

$$f(a) = a - 2$$

$$\text{Find } g(f(a))$$

$$a - 2 - 1$$

$$12) g(x) = 2x + 1 = 6x + 11$$

$$f(x) = 3x + 5$$

$$\text{Find } g(f(x))$$

$$2(3x+5) + 1$$

$$6x + 10 + 1$$

$$14) h(a) = a^2 + 3 = a^2 + 2a - 2$$

$$g(a) = 2a - 5$$

$$\text{Find } h(a) + g(a)$$

$$a^2 + 3 + 2a - 5$$

15) $f(x) = 2x^2 - 2 = 18x^2 + 12x$
 $g(x) = 3x + 1$
 Find $f(g(x))$

$$2(3x+1)^2 - 2$$

$$2(9x^2 + 6x + 1) - 2$$

17) $g(x) = -2x + 4 = -2x + 8$
 $f(x) = x - 2$
 Find $(g \circ f)(x)$

$$-2(x-2) + 4$$

19) $g(a) = a - 3 = 17$
 $h(a) = 4a - 4$
 Find $(g \circ h)(6)$

$$4a - 4 - 3$$

$$4(6) - 4 - 3$$

21) $g(n) = -3n - 5 = 55$
 $h(n) = 4n + 4$
 Find $g(h(-6))$

$$h(-6) = 4(-6) + 4$$

$$-24 + 4$$

$$-20$$

$$-3(-20) - 5$$

16) $h(x) = -3x - 3 = -9x - 15$
 $g(x) = 3x + 4$
 Find $h(g(x))$

$$-3(3x+4) - 3$$

18) $g(x) = -3x - 1 = -9x + 5$
 $h(x) = 3x - 2$
 Find $g(h(x))$

$$-3(3x-2) - 1$$

20) $g(x) = 2x - 1 = -5$
 $h(x) = -x$
 Find $(g \circ h)(2)$

$$2(-x) - 1$$

$$2(-2) - 1$$

22) $g(t) = t - 2 = -2$
 $f(t) = t^3 - 2t^2$
 Find $(g \circ f)(2)$

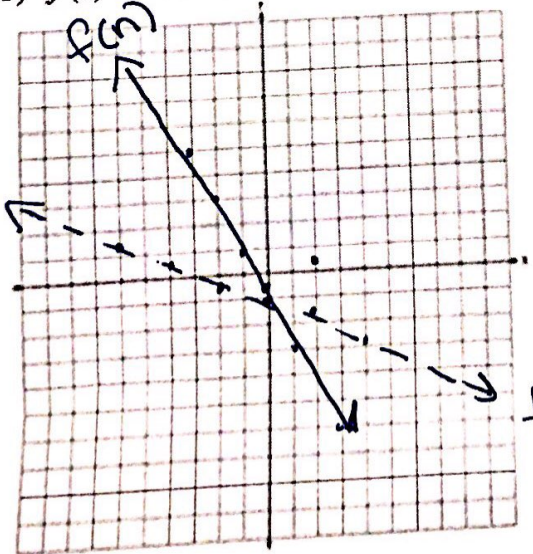
$$f(2) = 2^3 - 2(2)^2$$

$$8 - 8 = 0$$

$$0 - 2 = -2$$

Find the inverse of each function. Then graph the function and its inverse.

23) $f(n) = -2n - 1$



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

$$m = -\frac{1}{2} \quad b = -\frac{1}{2}$$

$$b^a = 180 \quad \log_b 180 = a$$

$$26) y^{11} = x \quad \log_y x = 11$$

Rewrite each equation in exponential form.

$$28) \log_y x = -\frac{4}{3} \quad y^{-4/3} = x$$

$$30) \log_n 110 = m \quad n^m = 110$$

Expand each logarithm.

$$32) \ln(x^4 y^2)$$

$$4 \ln x + 2 \ln y$$

$$34) \log_8 \left(\frac{u^5}{v} \right)^3$$

$$15 \log_8 u - 3 \log_8 v$$

Condense each expression to a single logarithm.

$$36) 2 \log_7 u - 3 \log_7 v$$

$$\log_7 \left(\frac{u^2}{v^3} \right)$$

$$38) \log_8 x + \log_8 y + 3 \log_8 z$$

$$\log_8 (y x z^3)$$

Solve:

$$40) 2^{3x-1} = 8^{2x+3}$$

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

$$3x-1 = 6x+9$$

$$-10 = 3x$$

$$-\frac{10}{3} = x$$

$$41) 3^{2x} \cdot 9^{x+2} = 27^{2x-9}$$

$$3^{2x} \cdot 3^{2(x+2)} = 3^{3(2x-9)}$$

$$2x + 2(x+2) = 3(2x-9)$$

$$2x + 2x + 4 = 6x - 27$$

$$31 = 2x$$

$$31/2 = x$$

$$42.) \frac{1}{32} = 8^{x+1}$$

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

$$-5 = 3(x+1)$$

$$-5 = 3x+3$$

$$-8/3 = x$$

$$y^{-1} = \frac{3 \pm \sqrt{x+7}}{2}$$

$$25) 8^u = v \quad \log_8 v = u$$

$$27) 19^m = 68 \quad \log_{19} 68 = m$$

$$29) \log_a b = -\frac{19}{12} \quad a^{-19/12} = b$$

$$31) \log_y 177 = x \quad y^x = 177$$

$$33) \log_2 \left(\frac{a^6}{b} \right)^2$$

$$12 \log_2 a - 2 \log_2 b$$

$$35) \log_3 \sqrt{a \cdot b \cdot c}$$

$$\frac{1}{2} \log_3 a + \frac{1}{2} \log_3 b + \frac{1}{2} \log_3 c$$

$$37) 6 \log_9 x - 12 \log_9 y$$

$$\log_9 \left(\frac{x^6}{y^{12}} \right)$$

$$39) 3 \log_6 x + 6 \log_6 y$$

$$\log_6 (y^6 x^3)$$