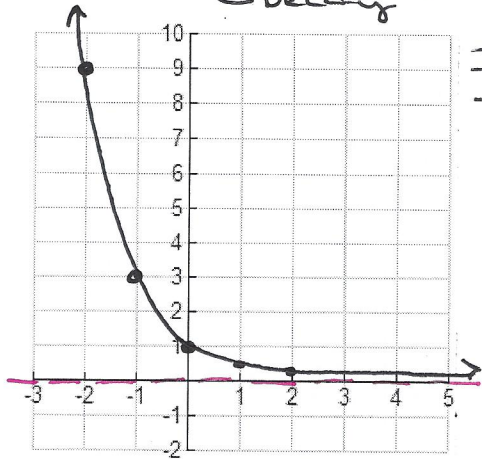


Sketch the graph of each function and identify the domain and range:

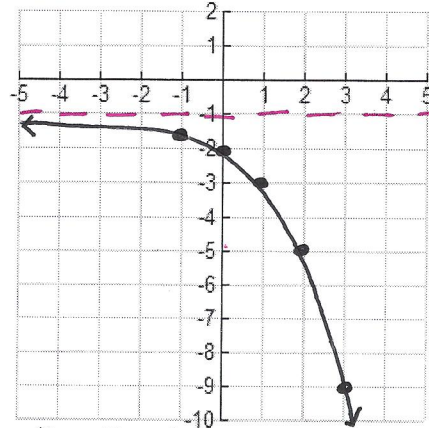
1. $f(x) = \left(\frac{1}{3}\right)^x + 0 \leftarrow y=0$
Decay



x	y
-2	9
-1	3
0	1
1	1/3
2	1/9

D: \mathbb{R} R: $y > 0$

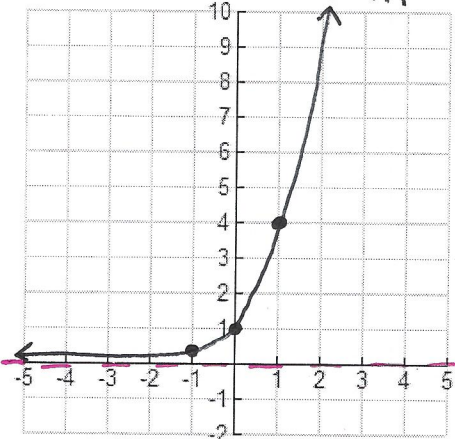
3. $f(x) = -2 \cdot 2^{x-1} - 1 \leftarrow y=-1$
Growth



x	y
-1	-1.5
0	-2
1	-3
2	-5
3	-9

D: \mathbb{R} R: $y < -1$

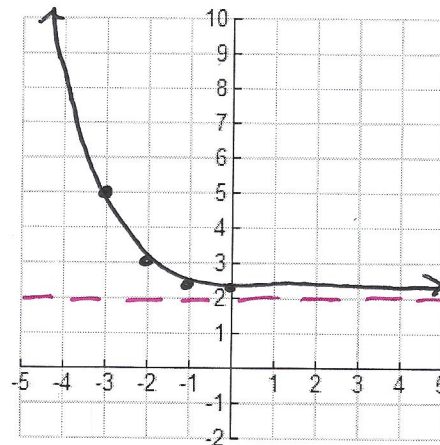
2. $f(x) = 4^x + 0 \leftarrow y=0$
Growth



x	y
-1	1/4
0	1
1	4
2	16

D: \mathbb{R} R: $y > 0$

4. $f(x) = \left(\frac{1}{3}\right)^{x+2} + 2 \leftarrow y=2$
Decay



x	y
-3	5
-2	3
-1	2.33
0	2.11

D: \mathbb{R} R: $y > 2$

Find the inverse of each function:

5. $g(x) = -2(x-3)^3$
 $x = -2(y-3)^3$

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

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

$\sqrt[3]{\frac{x}{-2}} + 3 = f(x)^{-1}$

6. $f(x) = -\frac{3}{x-1}$

$x = \frac{-3}{y-1}$

$(y-1)x = -3$

$y-1 = \frac{-3}{x}$

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

7. $g(x) = \sqrt[3]{x} - 1$

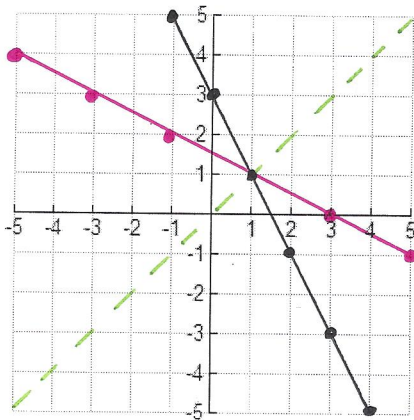
$x = \sqrt[3]{y} - 1$

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

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

Graph each function and identify the domain and range. Then find the inverse and graph; identify domain and range.

8. $g(x) = -2x + 3$



D: \mathbb{R}

R: \mathbb{R}

D: \mathbb{R}

R: \mathbb{R}

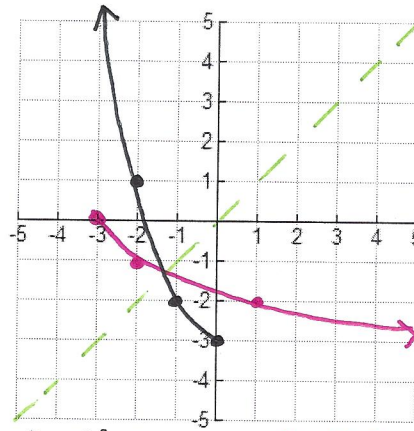
Inverse: $x = -2y + 3$

$x-3 = -2y$

$\frac{x-3}{-2} = f(x)^{-1}$

9. $f(x) = x^2 - 3; x \leq 0$

watch out!



D: $x \leq 0$

R: $y \geq -3$

D: $x \geq -3$

R: $y \leq 0$

x	y
-2	1
-1	-2
0	-3

Inverse

Inverse: $x = y^2 - 3$

$x+3 = y^2$

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

WS 15.3

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Rewrite each equation in logarithmic form.

1) $16^2 = 256 \rightarrow \log_{16} 256 = 2$

2) $5^3 = 125 \rightarrow \log_5 125 = 3$

3) $9^2 = 81 \rightarrow \log_9 81 = 2$

4) $20^{-2} = \frac{1}{400} \rightarrow \log_{20} \frac{1}{400} = -2$

5) $144^{-\frac{1}{2}} = \frac{1}{12} \rightarrow \log_{144} \frac{1}{12} = -\frac{1}{2}$

6) $12^{-2} = \frac{1}{144} \rightarrow \log_{12} \frac{1}{144} = -2$

Rewrite each equation in exponential form.

7) $\log_4 2 = \frac{1}{2} \rightarrow 4^{\frac{1}{2}} = 2$

8) $\log_5 625 = 4 \rightarrow 5^4 = 625$

9) $\log_{13} \frac{1}{169} = -2 \rightarrow 13^{-2} = \frac{1}{169}$

10) $\log_{16} 256 = 2 \rightarrow 16^2 = 256$

11) $\log_{125} \frac{1}{5} = -\frac{1}{3} \rightarrow 125^{-\frac{1}{3}} = \frac{1}{5}$

12) $\log_{20} 20 = 1 \rightarrow 20^1 = 20$

Evaluate each expression.

13) $\log_9 3 = x \rightarrow 9^x = 3$
 $x = \frac{1}{2}$

14) $\log_2 32 = x \rightarrow 2^x = 32$
 $x = 5$

15) $\log_{\frac{1}{2}} \frac{1}{16} = x \rightarrow \left(\frac{1}{2}\right)^x = \frac{1}{16}$
 $x = 4$

16) $\log_3 27 = x \rightarrow 3^x = 27$
 $x = 3$

17) $\log_6 216 = x \rightarrow 6^x = 216$
 $x = 3$

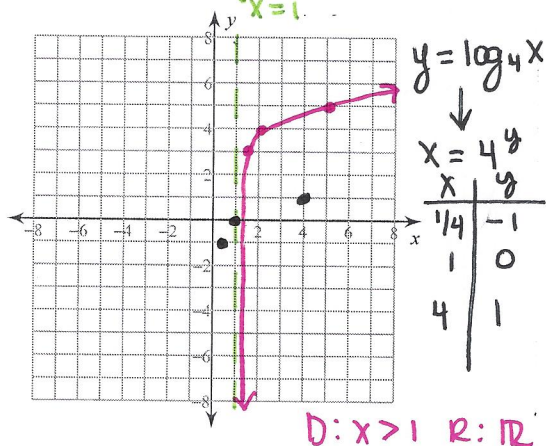
18) $\log_6 6 = x \rightarrow 6^x = 6$
 $x = 1$

19) $\log_2 \frac{1}{4} = x \rightarrow 2^x = \frac{1}{4}$
 $x = -2$

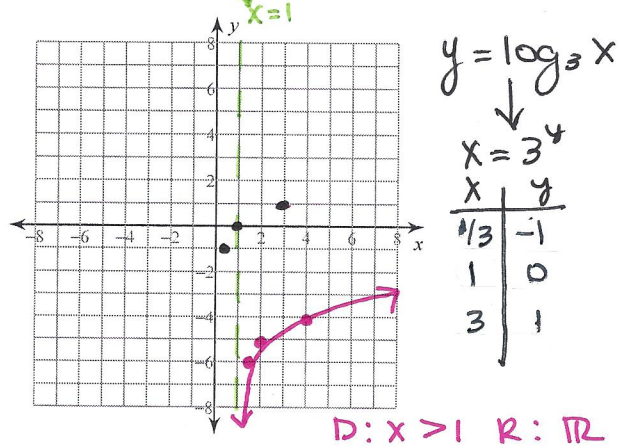
20) $\log_{\frac{1}{3}} \frac{1}{3} = x \rightarrow \left(\frac{1}{3}\right)^x = \frac{1}{3}$
 $x = 1$

Identify the domain and range of each. Then sketch the graph.

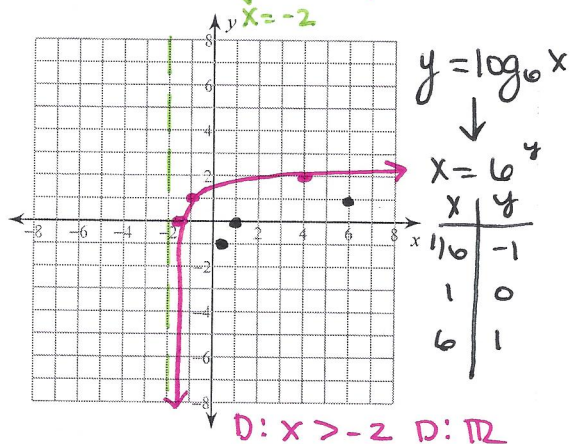
21) $f(x) = \log_4(x-1) + 4$ *right 1 up 4*



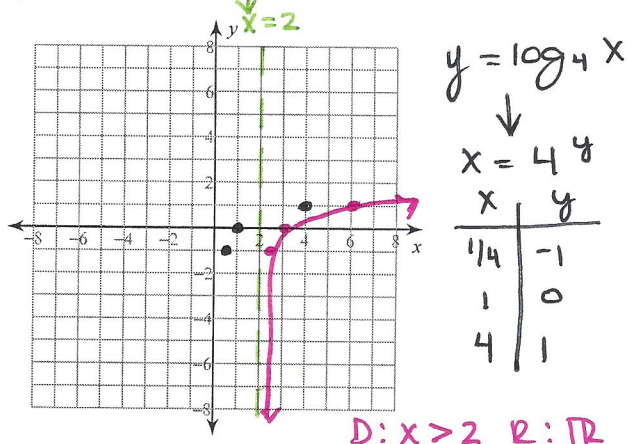
22) $f(x) = \log_3(x-1) - 5$ *right 1 down 5*



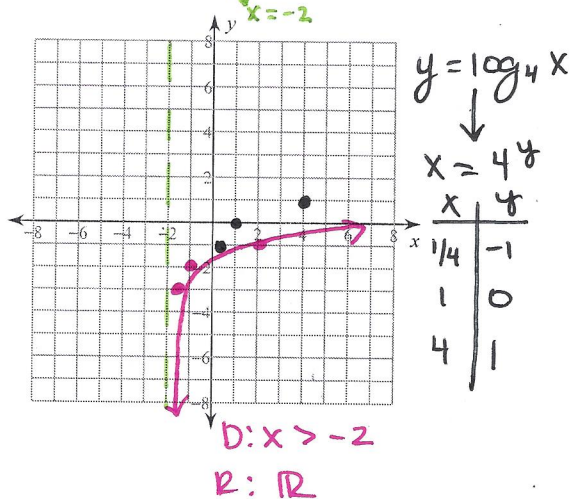
23) $f(x) = \log_6(x+2) + 1$ *left 2 up 1*



24) $f(x) = \log_4(x-2)$ *right 2*



25) $f(x) = \log_4(x+2) - 2$ *left 2 down 2*



26) $f(x) = \log_{1/3}(x+3) + 2$ *left 3 up 2*

