

**Find the inverse of the function.**

16.  $y = \log_5 x$   
 $x = \log_5 y$   
 $y = 5^x$

17.  $y = \ln x$   
 $y = \log_e x$   
 $x = \log_e y$   
 $y = e^x$

18.  $y = \log_{1/5} x$   
 $x = \log_{1/5} y$   
 $y = \left(\frac{1}{5}\right)^x$

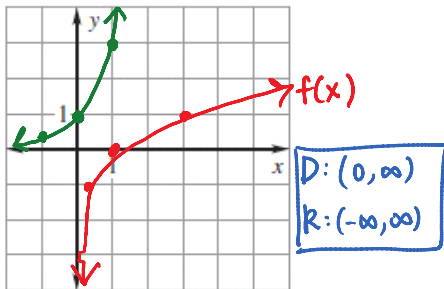
19.  $y = \log_{10} \frac{x}{2}$   
 $y = \log_{10} \left(\frac{1}{2}x\right)$   
 $x = \log_{10} \left(\frac{1}{2}y\right)$   
 $10^x = \frac{1}{2}y \Rightarrow y = 2 \cdot 10^x$

20.  $y = \log_6(x + 2)$   
 $x = \log_6(y + 2)$   
 $6^x = y + 2$   
 $y = 6^x - 2$

21.  $y = \log_3 9x$   
 $x = \log_3 9y$   
 $\frac{1}{9}(3^x) = (9y) \cdot \frac{1}{9}$   
 $y = \frac{1}{9}(3)^x$

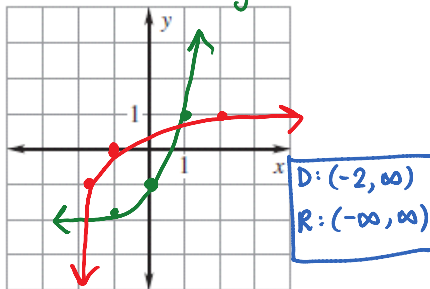
**Graph the function. State the domain and range.**

22.  $f(x) = \log_3 x$      $3^x = y$



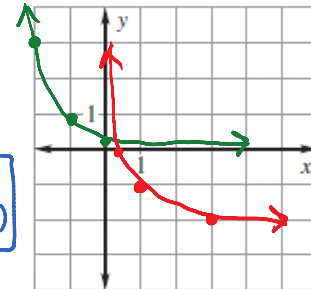
x	f(x)	x	f <sup>-1</sup> (x)
1/3	-1	1/3	-1
1	0	1	0
3	1	3	1

23.  $f(x) = \log_3(x + 2)$      $y = 3^{x-2}$



x	f(x)	x	f <sup>-1</sup> (x)
-1	-5/3	-5/3	-1
1	-1	-1	0
5	1	5	1

24.  $f(x) = -\log_3 x - 1$



x	f(x)	x	f <sup>-1</sup> (x)
1/3	-1	3	-2
1	0	1	-1
3	1	1/3	0

D: (0, infinity)  
R: (-infinity, infinity)

$x = -\log_3 y - 1$   
 $\frac{x+1}{-1} = \frac{-\log_3 y}{-1}$   
 $-x-1 = \log_3 y$   
 $3^{-x-1} = y$

25. **Galloping Speed** Four-legged animals run with two different types of motion: trotting and galloping. An animal that is trotting has at least one foot on the ground at all times. An animal that is galloping has all four feet off the ground at times. The number  $S$  of strides per minute at which an animal breaks from a trot to a gallop is related to the animal's weight  $w$  (in pounds) by the model  $S = 256.2 - 47.9 \log w$ . Approximate the number of strides per minute for a 450 pound horse when it breaks from a trot to a gallop.

$S = 256.2 - 47.9 \log(450)$   
 $\approx 129.11 \text{ strides}$

↑  
use calculator!

26. **Tornadoes** The wind speed  $S$  (in miles per hour) near the center of a tornado is related to the distance  $d$  (in miles) the tornado travels by the model  $S = 93 \log d + 65$ . Approximate the wind speed of a tornado that traveled 75 miles.

$$S = 93 \log(75) + 65$$
$$\approx 239.38 \text{ strides}$$