

4.1-4.3 Quiz Review

KEY

Use the composition of functions to determine whether f and g are inverses of one another.

1. $f(x) = 3x + 2; g(x) = \frac{1}{3}x - \frac{2}{3}$

$$f(g(x)) = 3\left(\frac{1}{3}x - \frac{2}{3}\right) + 2$$

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

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

$$g(f(x)) = x + \frac{2}{3} - \frac{2}{3} = x$$

yes

2. $f(x) = 3x - 2; g(x) = \frac{1}{3}x + 2$

$$f(g(x)) = 3\left(\frac{1}{3}x + 2\right) - 2$$

$$f(g(x)) = x + 6 - 2 = x + 4$$

No

Find the inverse of each function, then state the domain and range of $f^{-1}(x)$.

3. $f(x) = 5x + 8$

$$y = 5x + 8$$

$$y - 8 = 5x$$

$$\frac{y - 8}{5} = x$$

$$f^{-1}(x) = \frac{x - 8}{5}$$

$$f^{-1}(x) = \frac{1}{5}x - \frac{8}{5}$$

$$D_x \text{ of } f^{-1}(x): (-\infty, \infty)$$

$$R_y \text{ of } f^{-1}(x): (-\infty, \infty)$$

4. $g(x) = \sqrt{x + 6} \quad \begin{matrix} x + 6 \geq 0 \\ x \geq -6 \end{matrix}$

$$y = \sqrt{x + 6}$$

$$y^2 - 6 = x$$

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

$$D_x \text{ of } g^{-1}(x): [0, \infty)$$

$$R_y \text{ of } g^{-1}(x): [-6, \infty)$$

5. $f(x) = \frac{x}{x + 3}$

$$y(x + 3) = x$$

$$yx + 3y = x$$

$$3y = x - yx$$

$$3y = x(1 - y)$$

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

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

$$D_x \text{ of } f^{-1}(x): (-\infty, 1) \cup (1, \infty)$$

$$R_y \text{ of } f^{-1}(x): (-\infty, -3) \cup (-3, \infty)$$

Evaluate the exponential function for the given x values.

6. $f(x) = 2^x$

a. $x = -5$

$$\frac{1}{32}$$

b. $x = 3$

$$8$$

7. $g(x) = \left(\frac{2}{3}\right)^x$

a. $x = 2$

$$\frac{4}{9}$$

b. $x = -3$

$$\frac{27}{8}$$

Use a calculator to evaluate the exponential function for the given x value. Round to the nearest hundredth.

8. $f(x) = 3^x; x = 5.3$

$$337.86$$

9. $f(x) = e^x; x = \sqrt{20}$

$$87.54$$

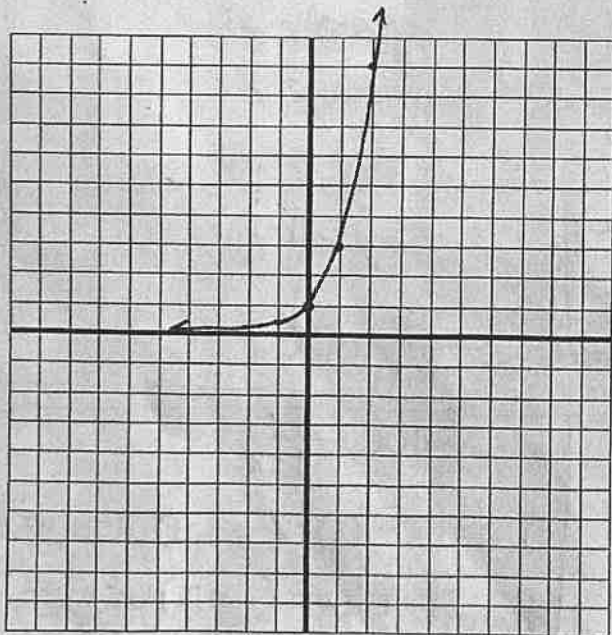
10. $f(x) = \left(\frac{1}{4}\right)^x; x = -3.1$

$$73.52$$

Sketch the graph of each function.

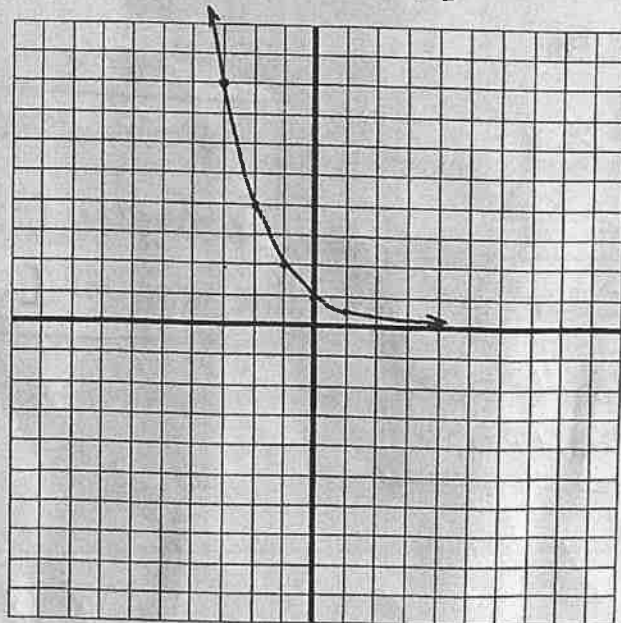
11. $f(x) = 3^x$

x	y
0	1
1	3
2	9



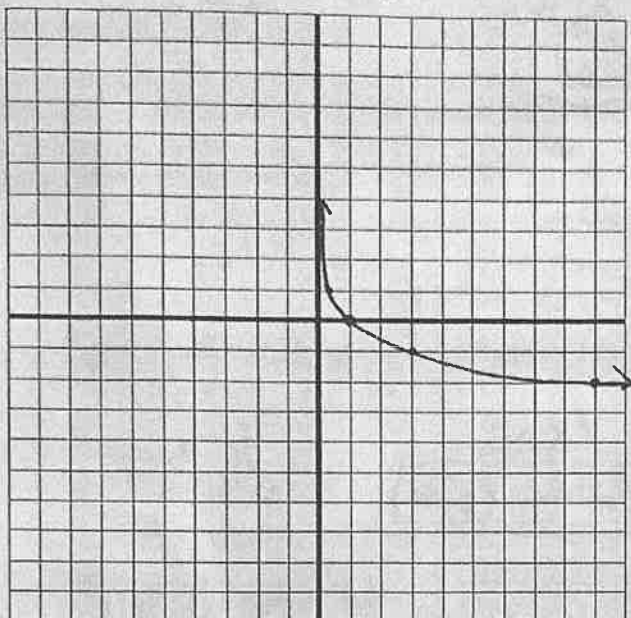
12. $f(x) = \left(\frac{1}{2}\right)^x$

x	y
-3	8
-2	4
-1	2
0	1
1	$\frac{1}{2}$



13. $f(x) = \log_{\frac{1}{3}} x$
 $\left(\frac{1}{3}\right)^y = x$

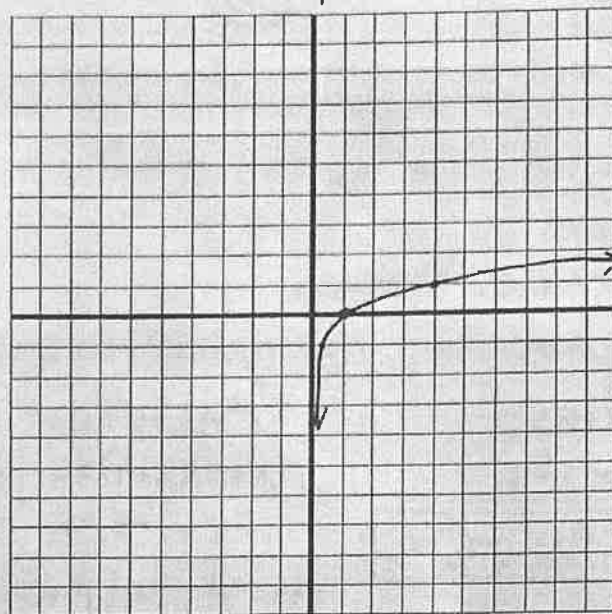
x	y
	-2
	-1
	0
	1



14. $f(x) = \log_4 x$

$4^y = x$

x	y
1/4	-1
1	0
4	1



Explain how to use the graph of the first function f to produce the graph of the second function F .

15. $f(x) = 2^x; F(x) = 2^{x-6}$ Shift right 6

16. $f(x) = 4^x; F(x) = 4^{x+3} - 2$ Shift left 3, shift down 2

17. $f(x) = (3)^x; F(x) = 4(3)^x$ Vertical Stretch away from the x-axis by a factor of 4.

18. $f(x) = \left(\frac{1}{3}\right)^x; F(x) = \left(\frac{1}{3}\right)^{x+2} - 3$ shift left 2, shift down 3

19. $f(x) = \log_8 x; f(x) = \log_8 x - 7$ Shift down 7

20. $f(x) = \log_4 x; f(x) = \log_4(x+1) - 5$ Shift left 1, Shift down 5

Write each equation in its exponential form.

21. $2 = \log_4 16$

$4^2 = 16$

22. $2 = \log 100$

$10^2 = 100$

23. $\ln x = 8$

$e^8 = x$

24. $\log_5 125 = 3$

$5^3 = 125$

Write each equation in its logarithmic form. Assume $y > 0$ and $b > 0$.

25. $8^3 = 512$

$3 = \log_8 512$

26. $2^5 = 32$

$\log_2 32 = 5$

27. $148.41 = e^5$

$\ln 148.41 = 5$

28. $e^4 = x - 8$

$\ln(x-8) = 4$

Evaluate each logarithmic expression. Do not use a calculator.

29. $\log_5 5$

1

30. $\log_3 27$

-3

31. $2(2^{\log_2 16})$

2(16)
32

32. $\log_5 1$

0

Find the domain of the function.

33. $f(x) = \log_5(x+5)$

$$x+5 > 0$$

$$x > -5$$

$$D_x \text{ of } f(x): (-5, \infty)$$

34. $f(x) = \log(x^2 + 6x + 5)$

$$x^2 + 6x + 5 > 0$$

$$(x+5)(x+1) > 0$$

c.v. -5, -1

$x+5$	-		+		+
$x+1$	-		-		+
	∞	-	-5	-	-1
	+		-		+

$$D_x \text{ of } f(x): (-\infty, -5) \cup (-1, \infty)$$

35. $f(x) = \log_3 x$

$$x > 0$$

$$D_x \text{ of } f(x): (0, \infty)$$

36. $f(x) = \log\left(\frac{4}{x-4}\right)$

$$\frac{4}{x-4} > 0$$

c.v. 4

4	+		+
$x-4$	-		+
	∞	-	4
	-		+

$$D_x \text{ of } f(x): (4, \infty)$$