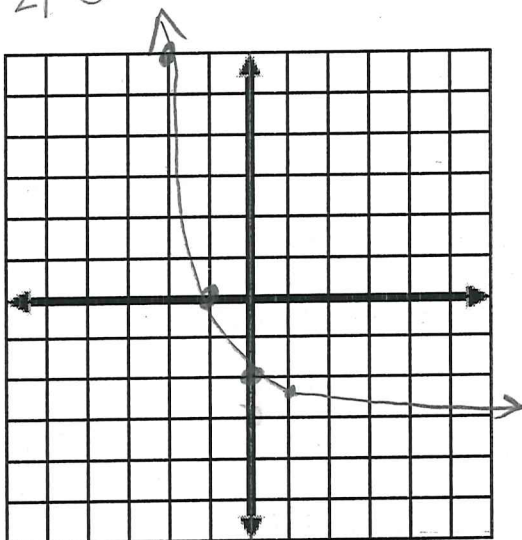


Graph the equation. Determine the asymptote, domain, and range.

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

x	y
0	-2
1	-2 ^{2/3}
-1	0
-2	6

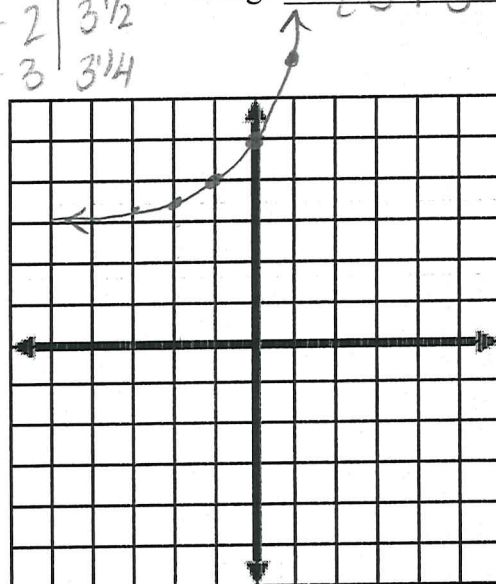
Asymptote $y = -3$
Domain $\{x \mid \mathbb{R}\}$
Range $\{y \mid y > -3\}$



2. $y = 2^{x+1} + 3$

x	y
0	5
1	7
-1	4
-2	3 ^{1/2}
-3	3 ^{1/4}

Asymptote $y = 3$
Domain $\{x \mid \mathbb{R}\}$
Range $\{y \mid y > 3\}$



Solve each of the following.

3. Martha invests \$3,000 in an account earning an APR of 5.2%. What is the balance on the account after 3 years?

$$A = 3000(1 + .052)^3 = \boxed{\$3492.76}$$

4. If you invested \$4,530 in an account that earns an APR of 4.25% compounded continuously, how much interest would you have after 5 years?

$$4530e^{.0425(5)} = \boxed{\$5602.55}$$

5. If you purchased a car 6 years ago for \$21,990 and it depletes at a rate of 18.5% annually, how much would it be worth today?

$$21,990(1 - .185)^6 = \boxed{\$6444.23}$$

Calculate, round to the nearest thousandth.

6. $\log_5 43$

$$\frac{\log 43}{\log 5} = \boxed{2.337}$$

7. $\log_8 412$

$$\frac{\log 412}{\log 8} = \boxed{2.896}$$

Solve each of the following.

8. $\log_3(2x+5) = \log_3(4x-13)$

$$2x+5 = 4x-13$$

$$18 = 2x \quad \boxed{x=9}$$

11. $-4 = \log_3 m$

$$m = 3^{-4} = \frac{1}{3^4} = \boxed{\frac{1}{81}}$$

9. $\log x + \log(x-3) = 1$

$$\log(x^2 - 3x) = 1$$

$$10 = x^2 - 3x$$

$$0 = x^2 - 3x - 10 \quad (12)$$

$$0 = (x-5)(x+2)$$

$$\boxed{x=5} \quad \cancel{x=-2}$$

$$2^{x+3} = 16^x$$

$$2^{x+3} = 2^{4x}$$

$$x+3 = 4x$$

$$3 = 3x$$

$$\boxed{x=1}$$

10. $\log_5 x = 3$

$$5^3 = x$$

$$\boxed{x=125}$$

13. $12^{3x} = 148$

$$3x \log 12 = \log 148$$

$$x = \frac{\log 148}{3 \log 12} = \boxed{.67}$$

Express y in terms of x.

14. $\log y = 4 \log(2x)$

$$y = (2x)^4$$

$$\boxed{y = 16x^4}$$

15. $\ln y = \frac{1}{4}(\ln 5 + 3 \ln x)$

$$\ln y = \ln(5x^3)^{1/4}$$

$$\boxed{y = \sqrt[4]{5x^3}}$$

Simplify each expression without a calculator.

16. $\ln e^4$

$$\boxed{4}$$

17. $\log_6 216$

$$6^x = 216$$

$$\boxed{x=3}$$

18. $\log_{12} 1$

$$12^x = 1$$

$$\boxed{x=0}$$

19. $\log 0.0001$

$$10^x = \frac{1}{10000}$$

$$\boxed{x=-4}$$

20. $\log_2 \frac{1}{32}$

$$2^x = 32^{-1}$$

$$2^x = 2^{-5}$$

$$\boxed{x=-5}$$

21. $\log_4 64$

$$4^x = 64$$

$$\boxed{x=3}$$

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Write each in exponential form.

22. $\log m = -2.5$

$$10^{-2.5} = m$$

23. $\ln 4.2 = x$

$$e^x = 4.2$$

24. $t = \log_3 432$

$$3^t = 432$$

Write in logarithmic form.

25. $4^{-2} = \frac{1}{16}$

$$\log_4 \frac{1}{16} = -2$$

26. $5^{x+2} = 8$

$$\log_5 8 = x+2$$

27. $.125 = 2^{-3}$

$$\log_2 .125 = -3$$

Express each to the nearest thousandth.

28. $\log 564$

$$2.751$$

29. $\ln 12.7$

$$2.542$$

30. $\log 44$

$$1.643$$

Write each expression as a single logarithm or rational number.

31. $\log 4 + \log 12 - \log x$

$$\log \left(\frac{4 \cdot 12}{x} \right) = \log \frac{48}{x}$$

33. $3 \log_5 x - 4 \log_5 y$

$$\log_5 \frac{x^3}{y^4}$$

32. $2 \log 5 + \log 4$

$$\log (25 \cdot 4)$$

$$\log 100 = 2$$

34. $\frac{1}{3} (\log 5 + 2 \log w)$

$$\log (5w^2)^{1/3}$$

$$\log \sqrt[3]{5w^2}$$

Expand each expression.

35. $\log_7 \frac{4w^5}{3n}$

$$\log_7 4 + 5 \log_7 w - \log_7 3 - \log_7 n$$

37. $\ln \frac{4t}{q}$

$$\ln 4 + \ln t - \ln q$$

36. $\log_2 (8qk)$

$$\log_2 8 + \log_2 q + \log_2 k$$

38. $\ln \sqrt[5]{4m}$

$$\frac{1}{5} (\ln 4 + \ln m)$$

OR

$$\frac{1}{5} \ln 4 + \frac{1}{5} \ln m$$

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