

1. What is the value of a if

$$\begin{array}{l} 5x - 2y = 6 \\ ax + 3y = 9 \end{array} \quad \text{and if}$$

a. The system has no solution.

b. The system has exactly one solution.

2. If $5e^x = 10$ and $3e^y = 4$, evaluate e^{2x-y} .

3. $\sin \frac{-7\pi}{4} =$

4. Prove $\tan x \sec x = \frac{\sin x}{\cos^2 x}$.

5. Solve the system of equations.

$$2x - y = 8$$

$$5x + y = 4.$$

$$x = 5y$$

6. Prove $\cos x = \frac{1 - \sin^2 x}{\cos x}$.

7. $\log_5 \frac{5}{625} =$

8. Find the domain, intercept(s), hole(s), horizontal and vertical asymptote(s) of the function

$$f(x) = \frac{x^3 + x^2 - 56x}{x^3 - 7x^2 - 49x + 343}.$$

9. Exactly evaluate $\sin \frac{11\pi}{12}$.

10. Solve $27^{6x-4} = 243^{5-2x}$ for x .

11. If $\sec x = \frac{8}{5}$ and $\tan x < 0$, find the values of all of the trigonometric functions.

12. $\log 1000 =$

13. Solve the system of equations.

$$8y = 27x - 44$$

$$11x + 16y = 42$$

14. Write $f(x) = 6 \cdot 5^{2x}$ as a function in terms of the natural exponential function.

15. $\tan \frac{7\pi}{6} =$

16. Tickets to ride an elephant at Elephant Walk are \$5 for TAMU seniors and \$8 for everyone else. If the revenue is \$13,266 from 2541 tickets, how many senior tickets were sold?

17. $\csc \frac{5\pi}{3} =$

18. If $y = -4\cos\left(5x - \frac{\pi}{3}\right) + 2$, find the amplitude, period, reflection, phase shift, and vertical shift.

$$19. \lim_{x \rightarrow \pm\infty} \frac{5x^2 - 6x^4 + 8}{4 - 7x^3 + 3x^4} =$$

$$20. \log_2 \sqrt{2} =$$

21. A helicopter flies a round trip between College Station and Houston. The flight from College Station to Houston is into a strong headwind and takes 1 hour, while the return trip is with the wind and takes 40 minutes. If the cities are 92 miles apart, what are the helicopter's speed and the wind's speed? Assume that the helicopter's speed and the wind's speed are constant.

$$22. e^{5\ln(x-3)} =$$

$$23. \sin \frac{\pi}{2} =$$

24. Solve

$$x^2 - 9(y+2)^2 = 24$$

$$x + (y+2)^2 = \frac{4}{3} \cdot$$

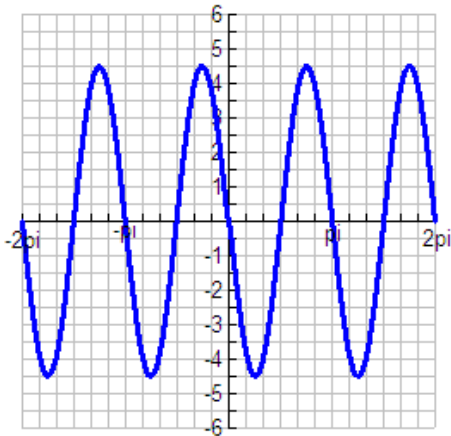
25. Find the domain, range, intercept(s), hole(s), horizontal and vertical asymptote(s) of the function $f(x) = \frac{5}{x+4}$.

26. $\log_5 1 =$

27. $\sec \pi =$

28. Suppose the population of jackalopes satisfies the exponential growth model, $p(t) = ae^{kt}$, where t is time in years. If $p(5) = 12150$ and $p(2) = 450$, find the exact values of a and k . What was the initial population of jackalopes?

29. Write a function of the form $f(x) = a \sin k(x - b)$, whose graph is shown below, where a , k , and b are positive.



30. Solve the system of equations.

$$y + 5 = 2 \ln x$$

$$3y - 6 = 4 \ln x$$

31. Convert 315 degrees to revolutions and to radians. Illustrate it as an angle in standard position.

32. $\ln\left(\ln\left(\ln e^{e^e}\right)\right) =$

33. What are the intercepts, asymptote, domain, and range of the function $f(x) = 4e^{x+5} - 8$? Is this function increasing, decreasing, or constant?

34. $\cot 3\pi =$

35. Solve $x^2 \cdot 13^x - 4x \cdot 13^x = 12 \cdot 13^x$ for x .

36. What is the supplement of the angle $\frac{5\pi}{7}$? Is $\frac{5\pi}{7}$ an acute or an obtuse angle?

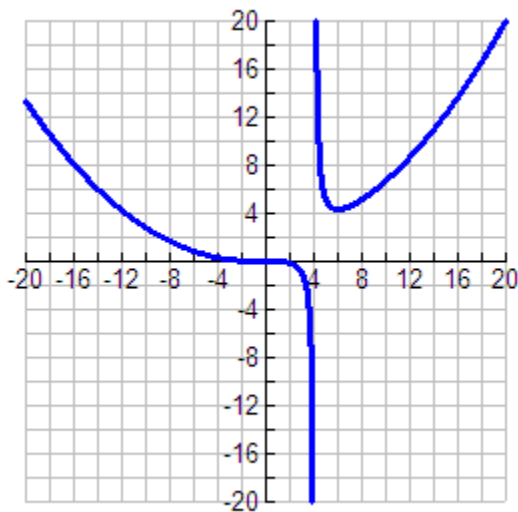
37. Exactly evaluate $\cos \frac{23\pi}{12}$.

38. In interval notation, what is the domain of the function $f(x) = \frac{\sqrt{x^2 - 25}}{\log_7(12 - x)}$.

39. Fully expand $\ln \frac{2x - 8}{49y^3}$.

40. If a circle has a 40-meter diameter, find the arc length and sector area subtended by a central angle of $\frac{\pi}{8}$.

41. Which of the following could be the rational function whose graph is shown? Do this problem without the aid of a calculator or graphing device.



- a. $f(x) = \frac{x^3}{25x+100}$
- b. $f(x) = \frac{50x+2}{25x-100}$
- c. $f(x) = \frac{25x^2}{25x+100}$
- d. $f(x) = \frac{x^3}{25x-100}$
- e. $f(x) = \frac{1}{25x-100}$

42. If $f(x) = 4\ln(2x+7) - 9$, find its inverse function, along with its domain and range.

43. Prove $\cos x \sin 2x = 2\sin x - 2\sin^3 x$.

44. Solve $12e^{2x-5} + 3 = 9$.

45. Given $\csc x = \frac{-9}{7}$ and x is in quadrant III, exactly evaluate $\sin 2x$.

46. Solve $\log_2(x-4) = 8 - \log_2(x+20)$ for x .

47. What is the intercept, asymptote, domain, and range of the function $f(x) = \ln(x-10) + 6$? Is this function increasing, decreasing, or constant?

48. A sample of radioactive substance decayed 30% after 8 years.

a. Find the half-life of this radioactive substance.

b. How much of a 100-gram sample will remain after 5 years?

49. Solve $5\log(7-4x)+4=10$ for x .

50. $\left(\frac{512}{81}\right)^{\frac{-4}{3}} =$

51. To five decimal places, approximate $\log_7 19$.