

Complete these problems without using a calculator. You may work together and discuss solutions, but copying of work and/or answers is not permitted.

Rewrite each expression without absolute value notation.

_____ 1. $|\pi - 2|$

_____ 2. $|e - \pi|$

_____ 3. $|5 - \sqrt{29}|$

_____ 4. $|x - 2|$ if $x < -5$

_____ 5. $|x^2 + 4|$

Rewrite as a piecewise function.

$y = \begin{cases} \text{_____} \\ \text{_____} \end{cases}$ 6. $y = |2x - 1|$

$y = \begin{cases} \text{_____} \\ \text{_____} \end{cases}$ 7. $y = |x^2 - 4|$

Solve each equation over the real numbers.

_____ 8. $x^2 = 4$

_____ 9. $x^2 = x + 6$

_____ 10. $x^3 = 9x$

_____ 11. $x^3 + 3x = 4x^2$

_____ 12. $x^2 - 8 = 0$

_____ 13. $x^3 = 8$

Solve each inequality.

_____ 14. $x^2 < 5$

_____ 15. $x^2 - 2x^3 > 0$

_____ 16. $x^2 < 2x + 8$

_____ 17. $x^2 \geq 7$

_____ 18. $\frac{1}{x} \geq 3$ if $x > 0$

Use POINT-SLOPE form to write the equation of the line described.

_____ 19. Contains (2, -5) with slope $\frac{1}{3}$

_____ 20. Contains (-1, 4) and is perpendicular to the line $2x - 5y = 1$

_____ 21. Undefined slope and contains (0, -1)

_____ 22. 0 slope containing (0, -1)

Questions 23 – 27 refer to a circle of radius 3 centered at the origin.

_____ 23. Write the standard form equation of the circle.

_____ 24. Write the equation of the top half of the circle in $y = f(x)$ form.

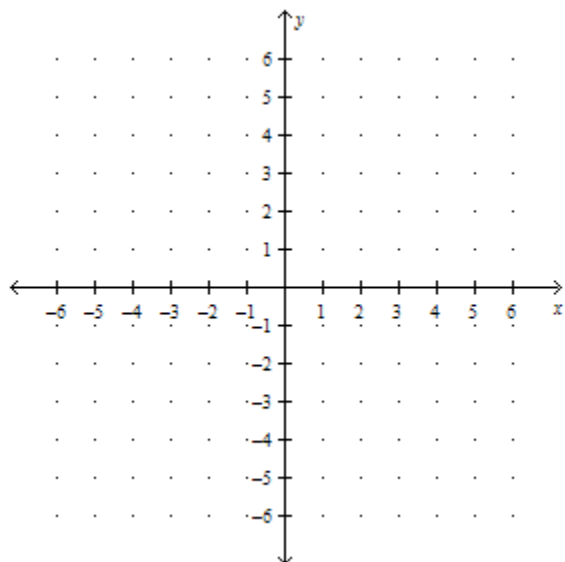
_____ 25. Write the equation of the left half of the circle in $x = g(y)$ form.

_____ 26. Write the equation of the right half of the circle in $x = g(y)$ form.

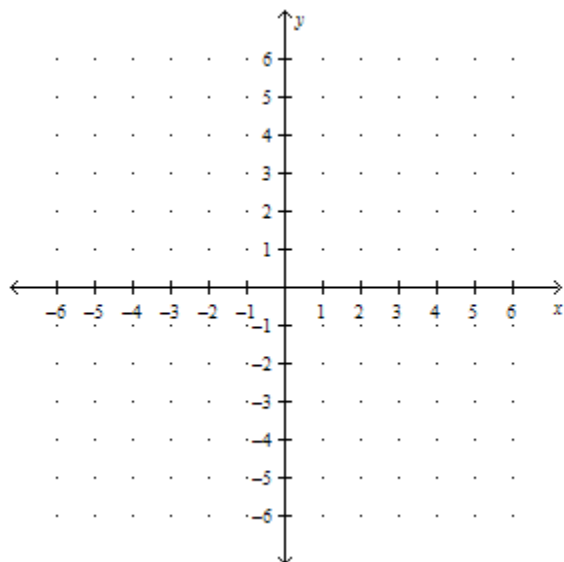
_____ 27. Write the equation of the lower half of the circle in $y = f(x)$ form.

Graph each curve.

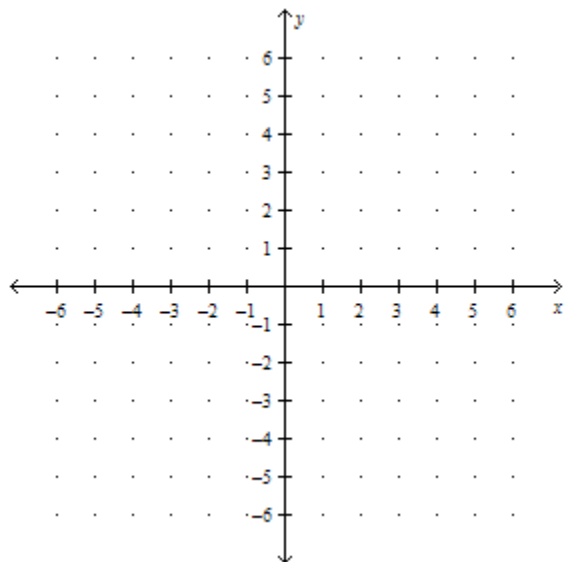
28. $y = x^2 - 4$



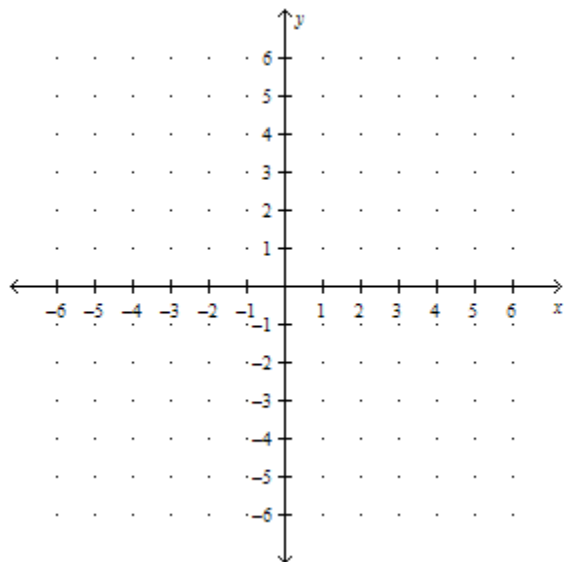
29. $x = 4 - y^2$



30. $x^2 + y^2 = 25$



31. $4x^2 + 25y^2 = 100$



_____ 32. Give the range of $y = \sin x$.

_____ 33. Give the domain of $y = \sin x$.

_____ 34. Give the range of $y = \arcsin x$.

_____ 35. Give the domain of $y = \arcsin x$.

_____ 36. Give the range of $y = \tan x$.

_____ 37. Give the domain of $y = \tan x$.

_____ 38. Give the range of $y = \tan^{-1}x$.

_____ 39. Give the domain of $y = \tan^{-1}x$.

Evaluate each expression.

_____ 40. $\cos\left(\sin^{-1}\left(-\frac{3}{5}\right)\right)$

_____ 41. Evaluate $\tan^{-1}(\sqrt{3})$

_____ 42. $\sin^{-1}\left(\frac{1}{2}\right) - \tan^{-1}(-1)$

_____ 43. Find all $x \in [-\pi, \pi]$ so that $2\cos^2 x = \cos x + 1$.

Expand and evaluate.

_____ 44. $\sum_{i=0}^4 2^i$

_____ 45. $\sum_{i=1}^3 (2i + 5)$

Give two forms of summation notation for each sum. In the first one, use $i = 1$ as the lower limit and in the second, use $i = 0$ as the lower limit.

_____ 46. $\sqrt{1} + \sqrt{2} + \sqrt{3} + \cdots + \sqrt{n}$

_____ 47. $\frac{1}{n} \cdot \sin\left(\frac{1}{n}\right) + \frac{1}{n} \cdot \sin\left(\frac{2}{n}\right) + \frac{1}{n} \cdot \sin\left(\frac{3}{n}\right) + \cdots + \frac{1}{n} \cdot \sin\left(\frac{n}{n}\right)$

Give the domain of each expression.

_____ 48. $\frac{1 - \ln x}{x}$

_____ 49. $\sqrt{9 - x^2}$

_____ 50. $\frac{x - e^x}{e^x}$

_____ 51. $\frac{x^2}{3 - 2 \ln x}$

Each function listed below is one-to-one. Find the indicated values WITHOUT explicitly solving for the function $f^{-1}(x)$.

$f(x) = x^3 + 2x - 3$

_____ 52. Give the domain of f .

_____ 53. Give the range of f .

_____ 54. Give the domain of f^{-1} .

_____ 55. Give the range of f^{-1} .

_____ 56. Find $f^{-1}(9)$.

$$f(x) = \sin x \text{ for } x \in \left[-\frac{\pi}{2}, 0\right]$$

_____ 57. Find the range of f .

_____ 58. Find the domain of f^{-1} .

_____ 59. Find the range of f^{-1} .

_____ 60. Find $f^{-1}(-\frac{1}{2})$

$$f(x) = e^x$$

_____ 61. Find the domain of f .

_____ 62. Find the range of f .

_____ 63. Find the domain of f^{-1} .

_____ 64. Find the range of f^{-1} .

_____ 65. Find $f^{-1}(4)$.

_____ 66. If f is a one-to-one function such that $f(2) = 4$ and $f(4) = 8$ and $g = f^{-1}$, find $g(4)$.

Simplify each expression.

_____ 67. $\ln 9 - \ln 3$

_____ 68. $e^{5\ln x^2}$

_____ 69. $6^{2-\sqrt{6}} \cdot 6^{\sqrt{6}-3}$

_____ 70. $\frac{1}{2}\ln 25 - \frac{1}{2}\ln 16$

_____ 71. $\log_3 24 - 3\log_3 6$

_____ 72. $\ln \sqrt[5]{e^3}$

_____ 73. $\ln\left(\frac{2}{e^3}\right) + \ln\left(\frac{e}{2}\right)$

_____ 74. $2 \ln 9 - \ln 3$

Rewrite each expression in base e.

_____ 75. 2^x

_____ 76. x^x

_____ 77. $\log_4(x)$

_____ 78. $\log(3x + 5)$

Separate each logarithmic expression as much as possible.

_____ 79. $\ln(3x)$

_____ 80. $\ln(x^2 \sin x)$

_____ 81. $\ln\left(\frac{(3x+5)(x-7)}{\sqrt{5x+1}}\right)$

_____ 82. $\ln((x^2 + 1)(x - 5)^2)$

Solve each equation.

_____ 83. $e^{3x} = 1000$

_____ 84. $\ln x + \ln(x - 2) = \ln 8$

_____ 85. $e^{3x-2} = \sqrt{e}$

_____ 86. $\log_2(x + 1) - \log_2(x) = 3$

_____ 87. $x = (\log_{10} 3)(\log_9 10)$

_____ 88. $2^{x^2-2x+1} = 16$

_____ 89. $\log_3(2x + 1) + \log_3(5) = 2$

_____ 90. $(\ln x)^2 - 5 \ln x + 6 = 0$

Evaluate each limit without using your calculator. Justify. Your justifications can use graphs. Use radian mode for any trig functions.

_____ 91. $\lim_{x \rightarrow 3} \sqrt[4]{5x+1}$

_____ 92. $\lim_{t \rightarrow -1} (t^3 - t^2 - 1)$

_____ 93. $\lim_{x \rightarrow 4} \frac{4-x}{x^2-16}$

_____ 94. $\lim_{t \rightarrow 0} \frac{\sqrt{5+t} - \sqrt{5}}{t}$

_____ 95. $\lim_{x \rightarrow \infty} \ln x$

_____ 96. $\lim_{x \rightarrow 0^+} \ln x$

_____ 97. $\lim_{x \rightarrow \frac{\pi}{2}^+} \sec x$

_____ 98. $\lim_{x \rightarrow \frac{\pi}{2}^-} \sec x$

_____ 99. $\lim_{x \rightarrow \infty} e^x$

_____ 100. $\lim_{x \rightarrow -\infty} e^x$

Use your graphing calculator and the table feature to evaluate each limit. Be sure TBLSET has independent set to ASK and dependent set to AUTO. Copy the table information.

_____ 101. $\lim_{x \rightarrow 0} \frac{x}{\sin x}$

_____ 102. $\lim_{x \rightarrow 0} \frac{\sin 2x}{x}$

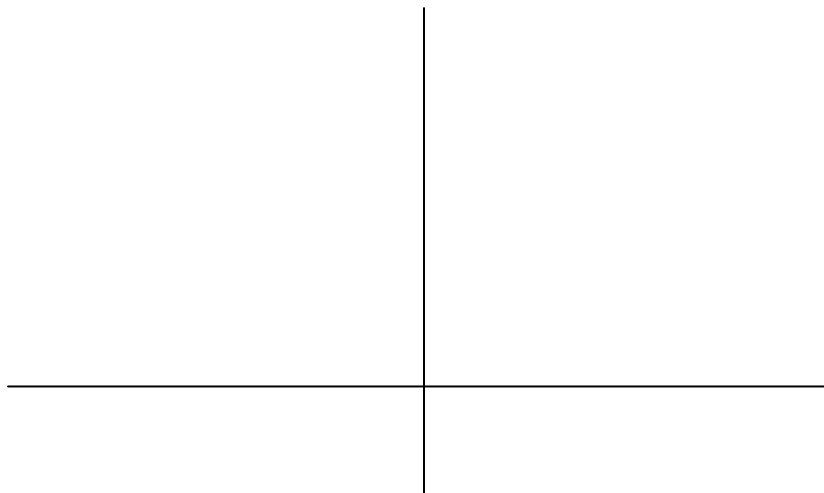
_____ 103. $\lim_{x \rightarrow \infty} \frac{\sin x}{x}$

_____ 104. $\lim_{x \rightarrow -\infty} \frac{2x^2 + 3x}{5 - x^2}$

Use your graphing calculator to complete the remainder of the assignment. All decimal approximations must be accurate to three decimal places unless otherwise stated in the problem; answers are to be given in radians unless otherwise specified. If you are using your calculator to solve an equation, you must write the equation you solved in order to receive credit.

105. Given $f(x) = x^2$ and $g(x) = 2^x$, complete the following questions.

- a. On the axes provided, graph f and g . Use the window $x: [-5, 5]$ and $y: [-5, 20]$. Indicate units on the x and y axes.



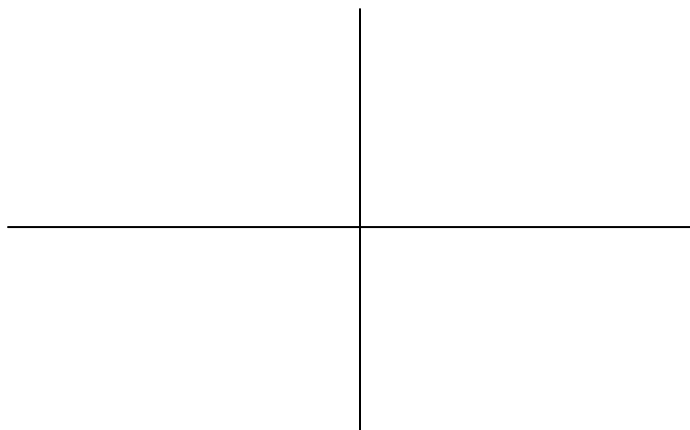
- b. Find the coordinates of all points of intersection of the graphs of f and g .

106. Find all points of intersection for the graphs of $f(x) = \ln(x + 1)$ and $g(x) = \cos(x^2)$. Show work.

Calculator Practice: Parametric Equations—Change your mode to PARAM and be sure to set the window for t , x , and y .

107. A particle travels along the graph of C where C is the curve described by the parametric equations $x(t) = \ln(t + 1) - 2t + t^2$ and $y(t) = \sin^2 t$.

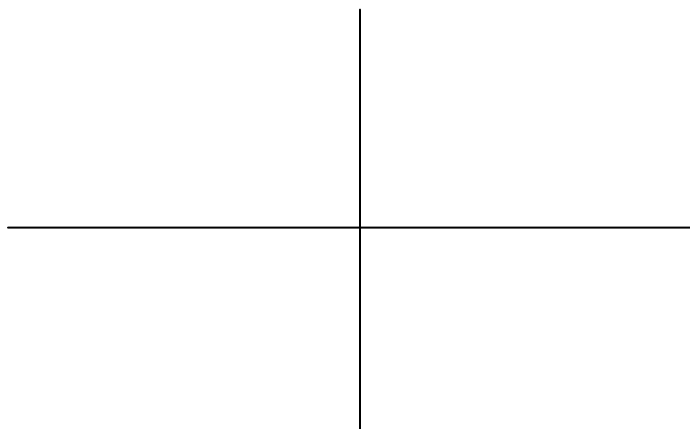
a. Graph the path of the particle for $t \in [0, \pi]$. Indicate direction of movement, and label units on your axes.



b. If $t \in (0, \pi)$, when is the particle on the x-axis?

108. C is the curve defined by the parametric equations $x = \sin t$ and $y = e^t$ for $t \in [-1, 2]$.

a. Graph the curve and indicate direction of movement.



b. Find the coordinates of the point when $t = \pi/2$.