

AP Calculus AB Summer Homework

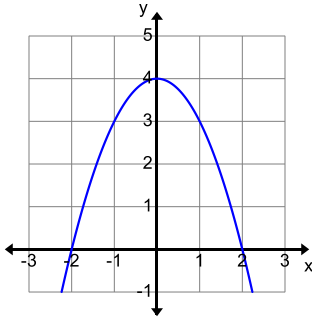
It is up on the website for the school (<http://libertyunion.schoolwires.net/heritage>) and also on my website. You will not need a book to do your summer homework. Your best resource will be your Pre-Calculus notes from this year and a graphing calculator. If you are stuck on some problems or have any questions I will be available at my AP Calculus Help Zoom Meeting on Monday, July 20th, from 10-11AM, and Tuesday, July 21st, from 1-2PM. A link to both Zoom Meetings will be posted on my Website. My expectation is that the Summer Homework is complete the first day of school and you will be having a test on the material within the first two weeks of school.

AP Calculus Summer Homework

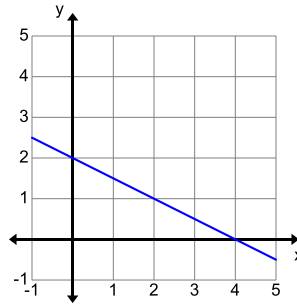
Name _____

In Exercises 1 – 4, match the equation with its graph. [Graphs are labeled (a), (b), (c), and (d).]

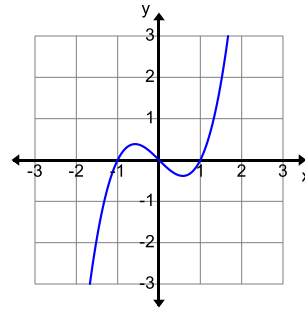
(a)



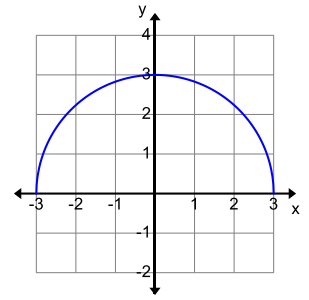
(b)



(c)



(d)



1. $y = -\frac{1}{2}x + 2$

2. $y = \sqrt{9 - x^2}$

3. $y = 4 - x^2$

4. $y = x^3 - x$

In Exercises 5 – 10, find any intercepts.

5. $y = x^2 + x - 2$

6. $y^2 = x^3 - 4x$

7. $y = x^2\sqrt{9 - x^2}$

8. $y = \frac{x^2 + 3x}{(3x + 1)^2}$

9. $x^2y - x^2 + 4y = 0$

10. $y = 2x - \sqrt{x^2 + 1}$

In Exercises 11-18, find the points of intersection of the graphs of the equations algebraically.

11. $x + y = 2$
 $2x - y = 1$

12. $2x - 3y = 13$
 $5x + 3y = 1$

13. $x + y = 7$
 $3x - 2y = 11$

14. $x^2 + y^2 = 25$
 $2x + y = 10$

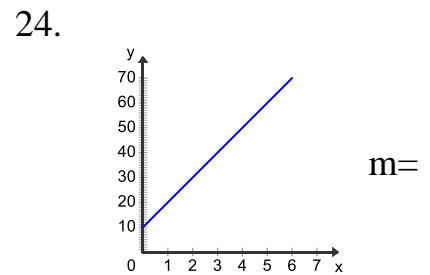
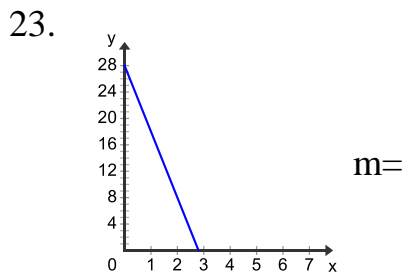
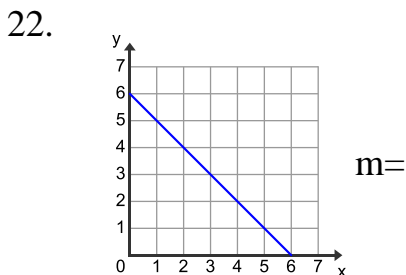
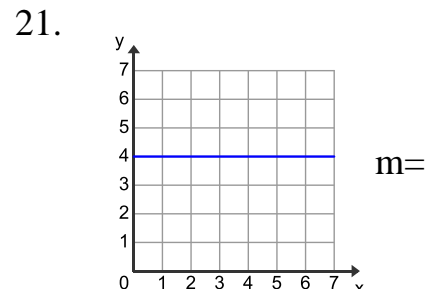
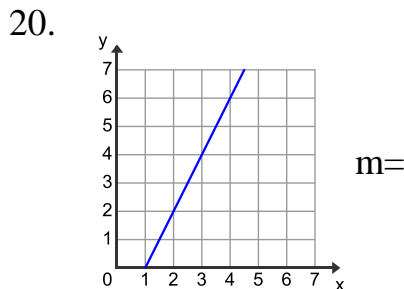
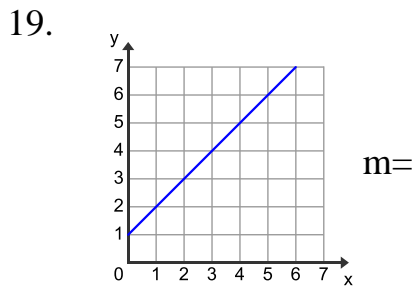
15. $x^2 + y^2 = 5$
 $x - y = 1$

16. $x^2 + y = 4$
 $2x - y = 1$

17. $y = x^3$
 $y = x$

18. $x = 3 - y^2$
 $y = x - 1$

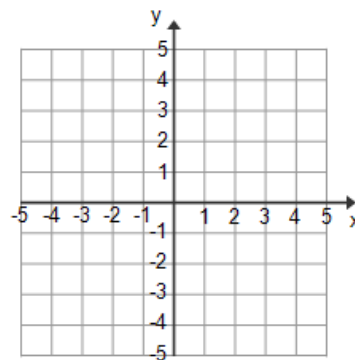
In Exercises 19-24, estimate the slope of the line from its graph.



25. Sketch the graph of the lines through the point with the indicated slopes. Make the sketches on the same set of coordinate axes.

Point (2, 3)

Slopes: (a) 0 (b) 1 (c) 2 (d) undefined



In Exercises 26 and 27, find the slope of the line passing through the given points.

26. (3, -4), (5, 2)

27. (2, 1), (2, 5)

In Exercises 28-31, find the slope and the y-intercept of the line.

28. $x + 5y = 20$

29. $6x - 5y = 15$

30. $x = 4$

31. $y = -1$

In Exercises 32-35, find an equation of the line that passes through the points, and sketch the line.

32. (2, 1), (0, -3)

33. (-3, -4), (1, 4)

34. (0, 0), (-1, 3)

35. (-3, 6), (1, 2)

In 36-39, find an equation of the line that passes through the point and has the indicated slope.

36. (0, 3), $m = \frac{3}{4}$

37. (-1, 2), $m = \text{und.}$

38. (0, 0), $m = \frac{2}{3}$

39. (-2, 4), $m = -\frac{3}{5}$

In 40-45, evaluate (if possible) the function at the given value(s) of the independent variable. Simplify the results.

40. $f(x) = 2x - 3$

a. $f(0)$

b. $f(-3)$

c. $f(b)$

d. $f(x - 1)$

41. $f(x) = \sqrt{x + 3}$

a. $f(-2)$

b. $f(6)$

c. $f(c)$

d. $f(x + \Delta x)$

42. $f(x) = \cos 2x$

a. $f(0)$

b. $f(-\frac{\pi}{4})$

c. $f(\frac{\pi}{3})$

43. $f(x) = \sin x$

a. $f(\pi)$

b. $f(\frac{5\pi}{4})$

c. $f(\frac{2\pi}{3})$

44. $f(x) = \begin{cases} 2x + 1, & x < 0 \\ 2x + 2, & x \geq 0 \end{cases}$

a. $f(-1)$

b. $f(0)$

c. $f(2)$

d. $f(t^2 + 1)$

45. $f(x) = \begin{cases} x^2 + 2, & x \leq 1 \\ 2x^2 + 2, & x > 1 \end{cases}$

a. $f(-2)$

b. $f(0)$

c. $f(1)$

d. $f(s^2 + 2)$

In Exercises 46-53, graph the following functions on a separate piece of graph paper and find the domain and range. Plot at least 3 specific points. You can use a graphing calculator to verify your graph.

46. $f(x) = 4 - x$

47. $g(x) = \frac{4}{x}$

48. $h(x) = \sqrt{x - 1}$

49. $f(x) = \frac{1}{2}x^3 + 2$

50. $h(x) = \sqrt{9 - x^2}$

51. $g(t) = 2 \sin \pi t$

52. $h(\theta) = -5 \cos \frac{\theta}{2}$

53. $g(x) = x + \sqrt{4 - x^2}$

54. Given $f(x) = \sqrt{x}$ and $g(x) = x^2 - 1$, find the following:

a. $f(g(1))$

b. $g(f(1))$

c. $g(f(0))$

d. $f(g(-4))$

e. $f(g(x))$

f. $g(f(x))$

In Exercises 55-58, find the composite functions $(f \circ g)$ and $(g \circ f)$. What is the domain of each composite function? Are the two composite functions equal?

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

56. $f(x) = x^2 - 1$

57. $f(x) = \frac{1}{x}$

58. $f(x) = \frac{1}{x}$

$g(x) = \sqrt{x}$

$g(x) = \cos x$

$g(x) = x^2 + 1$

$g(x) = \sqrt{x + 2}$

59. Fill out the table without using a calculator. Use the special triangles to help you.

	$\sin x$	$\cos x$	$\tan x$	$\csc x$	$\sec x$	$\cot x$
$0, 2\pi$						
$\pi/6$						
$\pi/4$						
$\pi/3$						
$\pi/2$						
$2\pi/3$						
$3\pi/4$						
$5\pi/6$						
π						
$7\pi/6$						
$5\pi/4$						
$4\pi/3$						
$3\pi/2$						
$5\pi/3$						
$7\pi/4$						
$11\pi/6$						

60. Find the following without using a calculator.

a. $\sin^{-1}(-1) =$ b. $\cos^{-1}\left(\frac{-1}{\sqrt{2}}\right) =$ c. $\cos^{-1}\left(\frac{-1}{2}\right) =$ d. $\sin^{-1}\left(\frac{-1}{2}\right) =$

61. Find the following without using a calculator.

a. $\sin^{-1}(\tan \pi)$ b. $\cos^{-1}\left(\cos \frac{5\pi}{4}\right)$ c. $\cos\left(\tan^{-1} \frac{1}{\sqrt{3}}\right)$ d. $\tan\left(\cos^{-1} \frac{-1}{\sqrt{2}}\right)$

62. Find the six trig functions for the given angle.

a. $\cos^{-1}\left(\frac{-4}{5}\right)$ b. $\tan^{-1}(3)$

Graphing Calculator Section: For problems, 63-72, graph the parent function of each set using your calculator. Sketch each of the additional equations in the family on the same axes. Use a different color for each equation. Check your graphs with your graphing calculator. Draw in the axes.

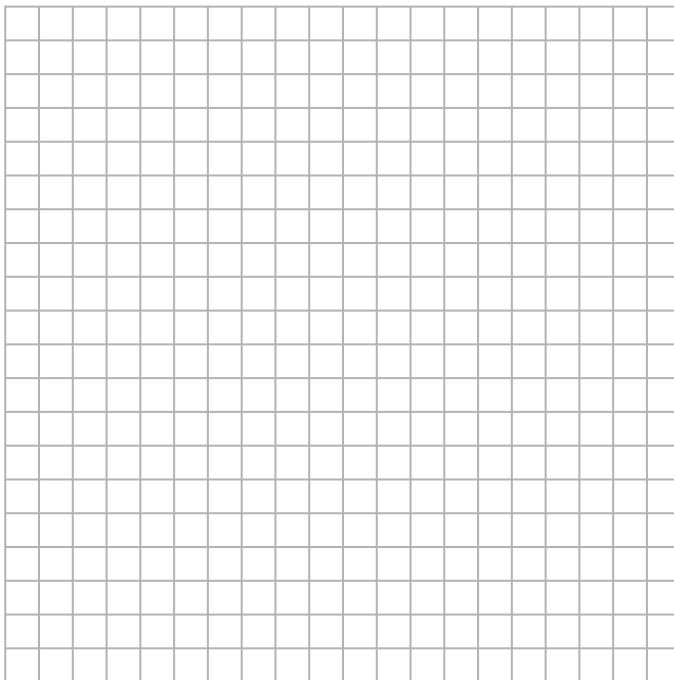
63. Parent Function: $y = x^2$

a) $y = x^2 - 4$

b) $y = (x + 3)^2$

c) $y = -x^2$

d) $y = -(x + 3)^2 + 4$



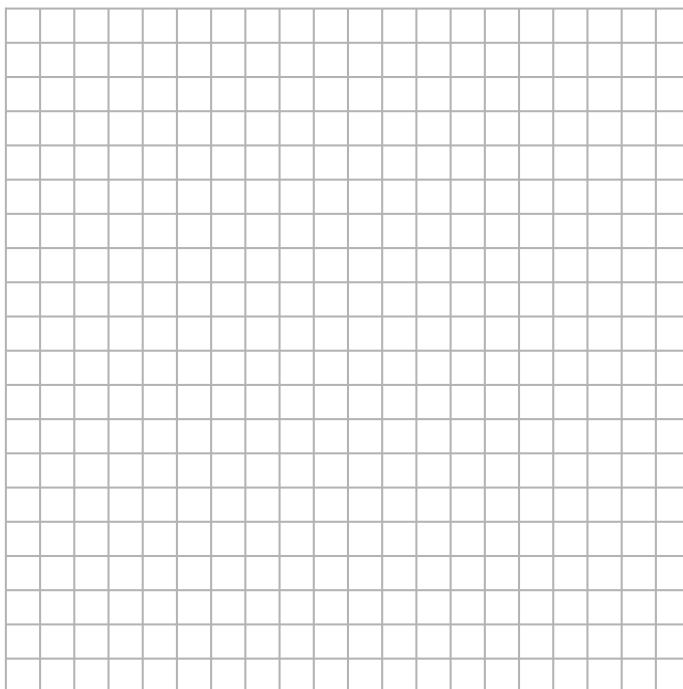
64. Parent Function: $y = x^2$

a) $y = (x + 3)^2 + 5$

b) $y = -2(x + 1)^2 + 4$

c) $y = \frac{1}{3}(x - 3)^2 - 4$

d) $y = -3(x + 2)^2 - 2$



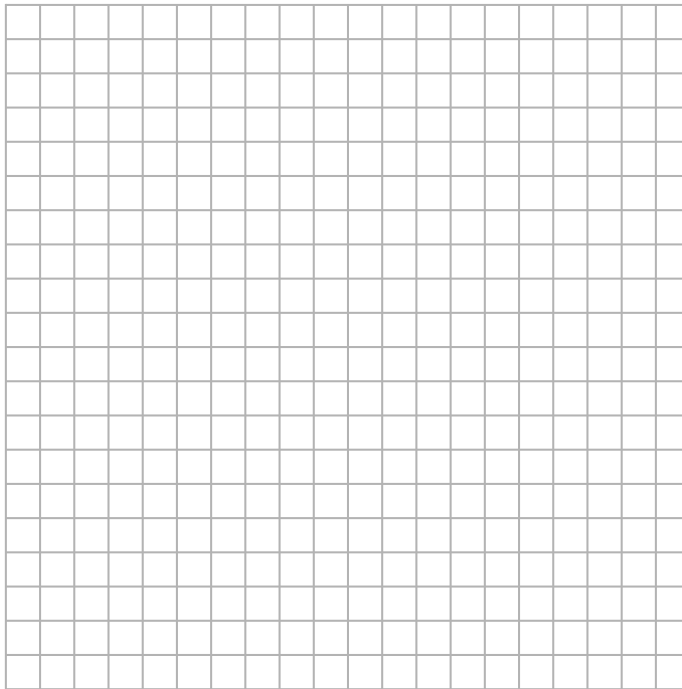
65. Parent Function: $y = \sin x$ (Set mode to Radians)

a) $y = \sin(2x)$

b) $y = \sin(x) - 2$

c) $y = 2\sin x$

d) $y = 2\sin(2x) + 2$



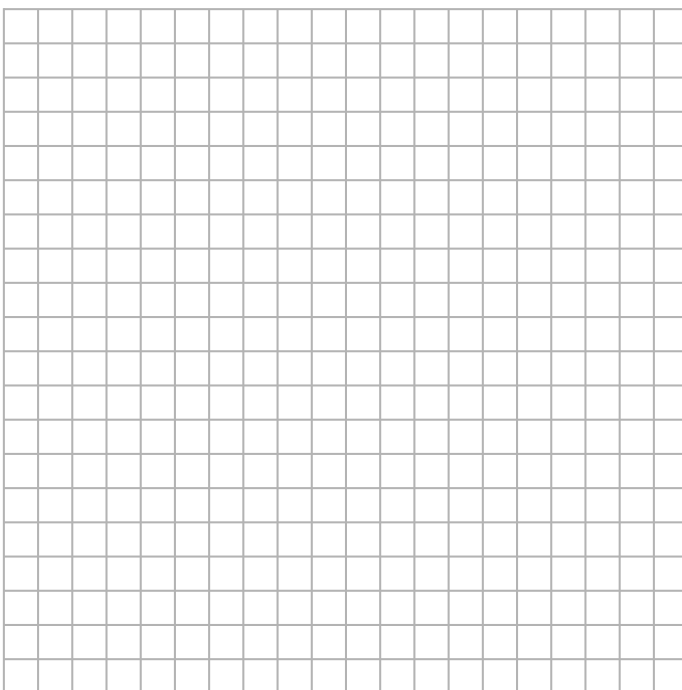
66. Parent Function: $y = \cos x$ (Set mode to Radians)

a) $y = \cos(3x)$

b) $y = \cos \frac{x}{2}$

c) $y = 2\cos(x) + 2$

d) $y = -2\cos x - 1$



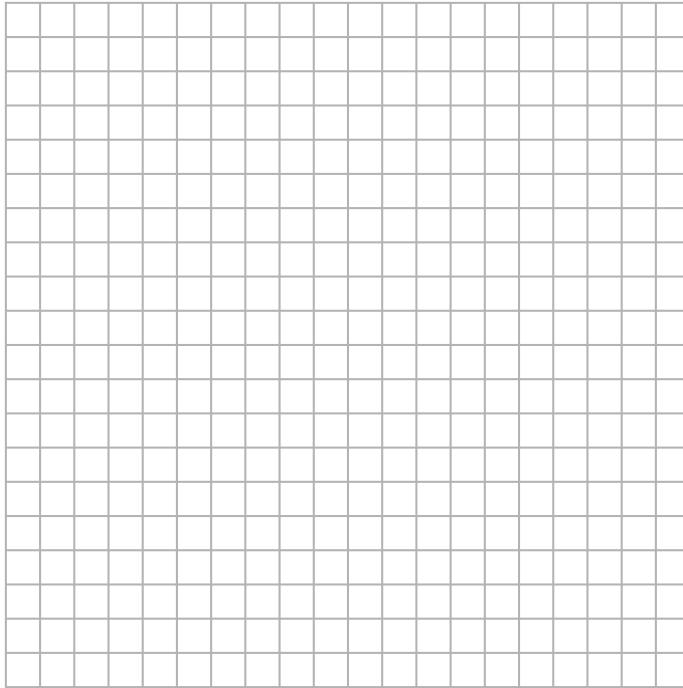
67. Parent Function: $y = x^3$

a) $y = x^3 + 2$

b) $y = -x^3$

c) $y = (x - 4)^3$

d) $y = -2(x + 2)^3 + 1$



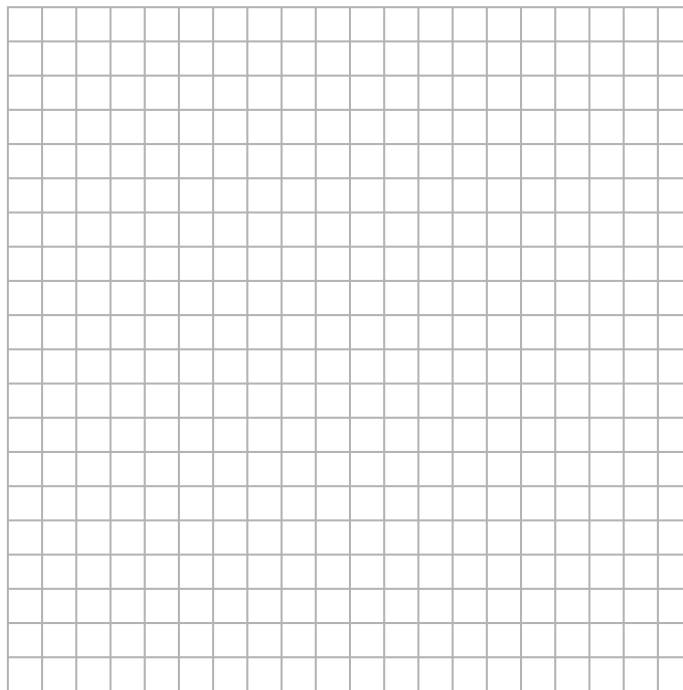
68. Parent Function: $y = \sqrt{x}$

a) $y = \sqrt{x} - 2$

b) $y = \sqrt{-x}$

c) $y = -\sqrt{x}$

d) $y = \sqrt{6 - x}$



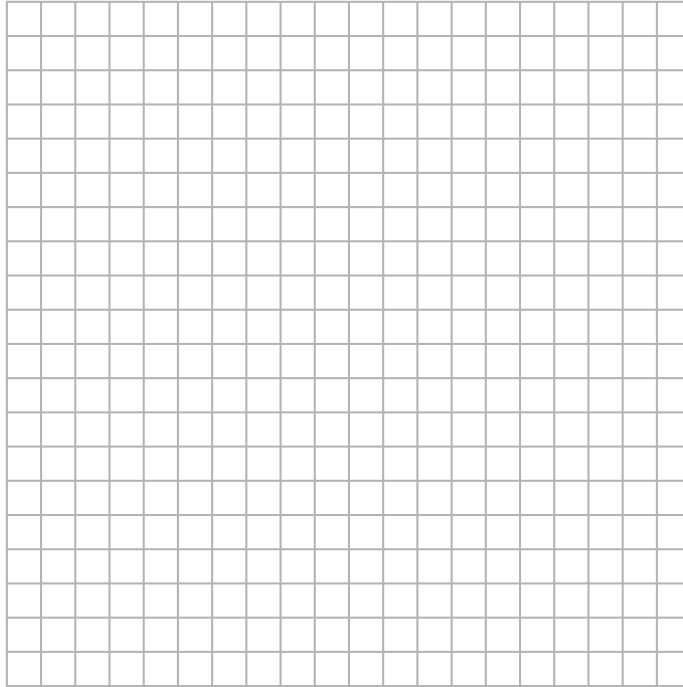
69. Parent Function: $y = \sqrt{x}$

a) $y = -2\sqrt{x}$

b) $y = -\sqrt{4-x}$

c) $y = -\frac{1}{2}\sqrt{x+2} - 5$

d) $y = 2\sqrt{x-3} + 4$



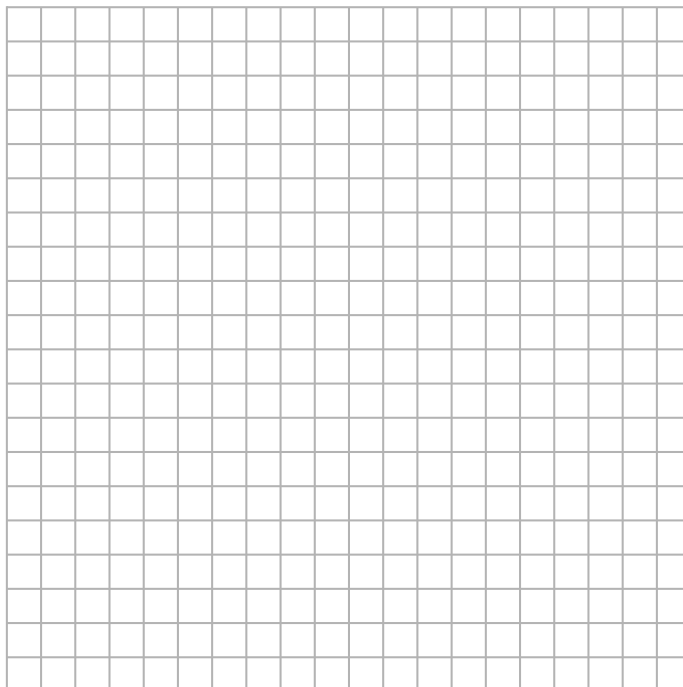
70. Parent Function: $y = \ln x$

a) $y = \ln(x + 3)$

b) $y = \ln(x) + 3$

c) $y = -\ln x$

d) $y = \ln|x|$



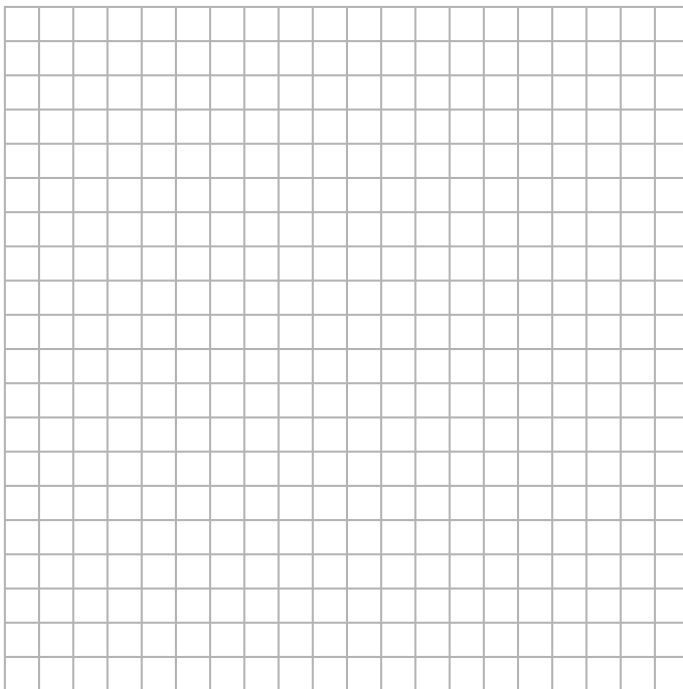
71. Parent Function: $y = e^x$

a) $y = -e^x$

b) $y = e^{-x}$

c) $y = e^{2x} + 3$

d) $y = e^{0.5x}$



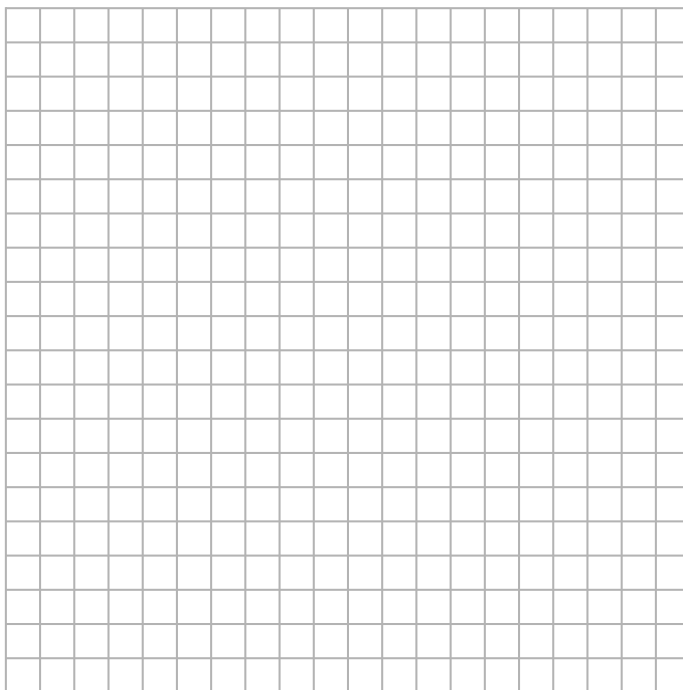
72. Parent Function: $y = \frac{1}{x}$

a) $y = \frac{1}{x-2}$

b) $y = -\frac{1}{x}$

c) $y = \frac{1}{x+4}$

d) $y = \frac{2}{(5-x)}$



Use a graphing calculator on the remaining problems.

73. Given: $f(x) = x^4 - 3x^3 + 2x^2 - 7x - 11$

Find all roots to the nearest 0.001

74. Given: $f(x) = 3 \sin(2x) - 4x + 1$ from $[-2\pi, 2\pi]$

Find all roots to the nearest 0.001

Note: All trig functions are done in radian mode.

75. Given: $f(x) = 0.7x^2 + 3.2x + 1.5$

Find all roots to the nearest 0.001

76. Given: $f(x) = x^4 - 8x^2 + 5$

Find all roots to the nearest 0.001

77. Given: $f(x) = x^3 + 3x^2 - 10x - 1$

Find all roots to the nearest 0.001

78. Given: $f(x) = 100x^3 - 203x^2 + 103x - 1$

Find all roots to the nearest 0.001

79. Given: $f(x) = |x - 3| + |x| - 6$

Find all roots to the nearest 0.001

80. Given: $f(x) = |x| - |x - 6|$

Find all roots to the nearest 0.001

Solve the following Inequalities.

81. $x^2 - x - 6 > 0$

82. $x^2 - 2x - 5 \geq 3$

83. $x^3 - 4x < 0$

Find the point(s) of intersection.

84. Given: $\begin{cases} f(x) = 3x + 2 \\ g(x) = -4x - 2 \end{cases}$

85. Given: $\begin{cases} f(x) = x^2 - 5x + 2 \\ g(x) = 3 - 2x \end{cases}$