AP Calculus Summer Homework

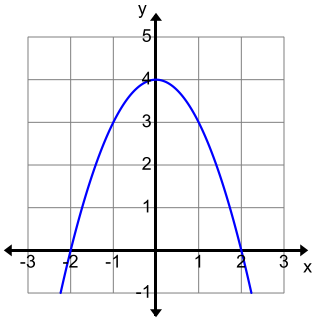
It will be up on the website for the school (http://libertyunion.schoolwires.net/heritage). If you would like a hard copy, come to room A104. You will not need a book to do your summer homework. Your best resource will be your Pre-Calculus notes from this year and a graphing calculator. If you are stuck on some problems or have any questions, I will available in person in room A104, on June 14th, 3:15 – 4:15, as well as on June 28th, from 3:15 – 4:15. Please bring a mask. 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

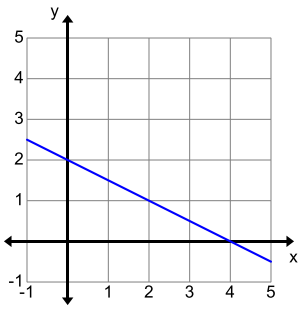
Name_____

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

(a)



(b)



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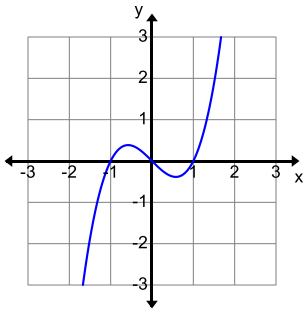

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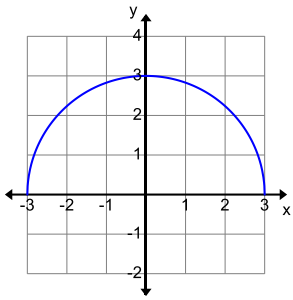


1. $y = -\frac{1}{2}x + 2$

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

3. $y = 4 - x^2$

4. $y = x^3 - x$

In Exercises 5 – 10, find <u>any</u> 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. $x^2 + y^2 = 25$
    $2x + y = 10$

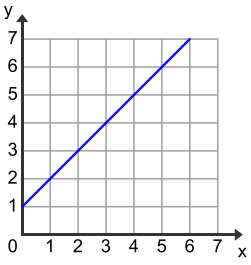
15. $x^2 + y^2 = 5$
    $x - y = 1$

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.

19. 

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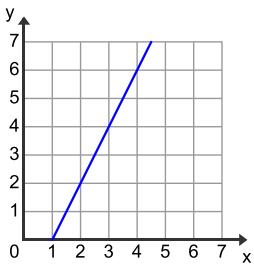
20. 

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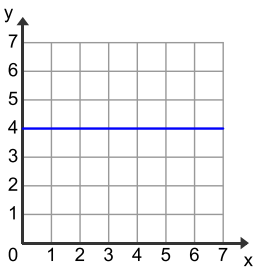
21. 

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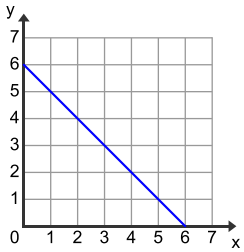
22. 

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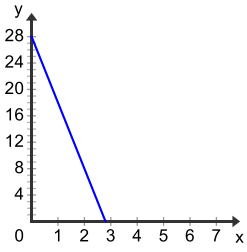
23. 

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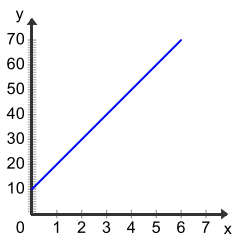
24. 

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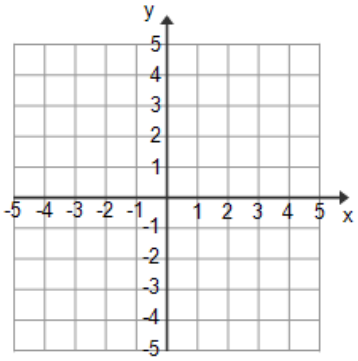
25. Sketch the graph of the lines through the point with the indicated slopes. Make the sketches on the same set of coordinate axes.

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. $(-1, 2), m = und.$

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

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. $f(x) = x^2$
$g(x) = \sqrt{x}$

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

57. $f(x) = \frac{1}{x}$
$g(x) = x^2 + 1$

58. $f(x) = \frac{1}{x}$
$g(x) = \sqrt{x+2}$

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. $tan\left(cos^{-1}\frac{-1}{\sqrt{2}}\right)$

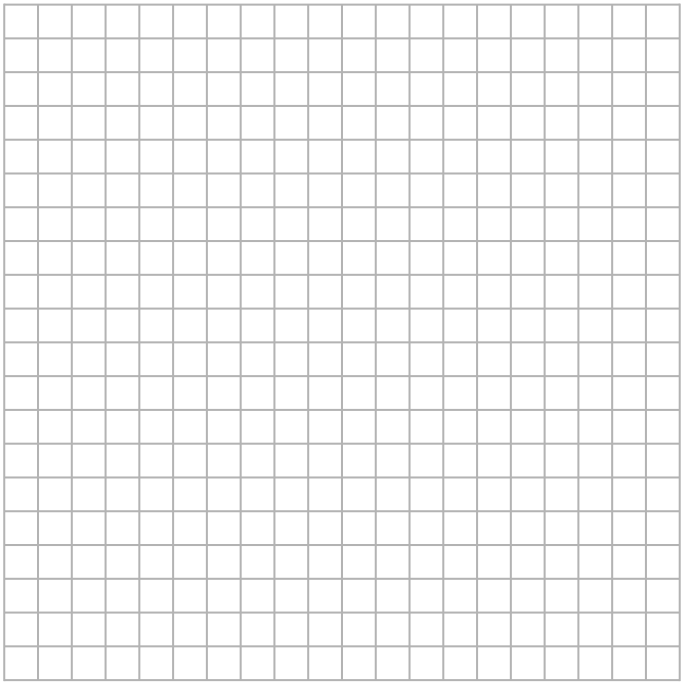
62. Find the six trig functions for the given angle.

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.

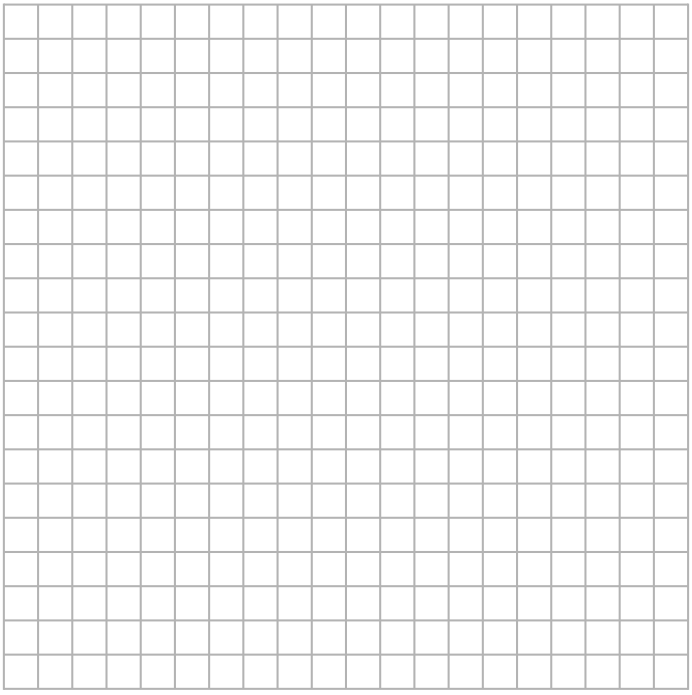
63. Parent Function: $y = x^2$

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



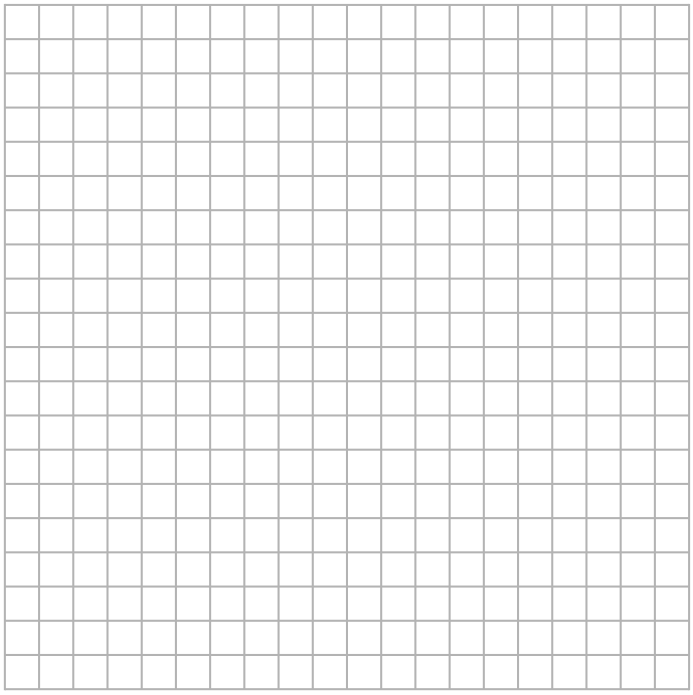
64. Parent Function: $y = x^2$

a) $y = (x + 3)^2 + 5$ b) $y = -2(x + 1)^2 + 4$ c) $y = \frac{1}{3}(x - 3)^2 - 4$ d) $y = -3(x + 2)^2 - 2$



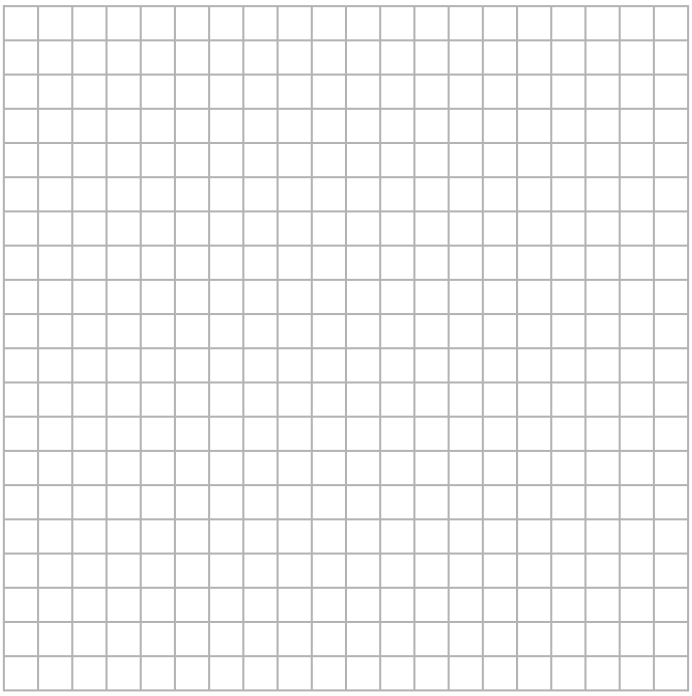
65. Parent Function: $y = \sin x$ (Set mode to Radians)

a) $y = \sin(2x)$ b) $y = \sin(x) - 2$ c) $y = 2\sin x$ d) $y = 2\sin(2x) + 2$



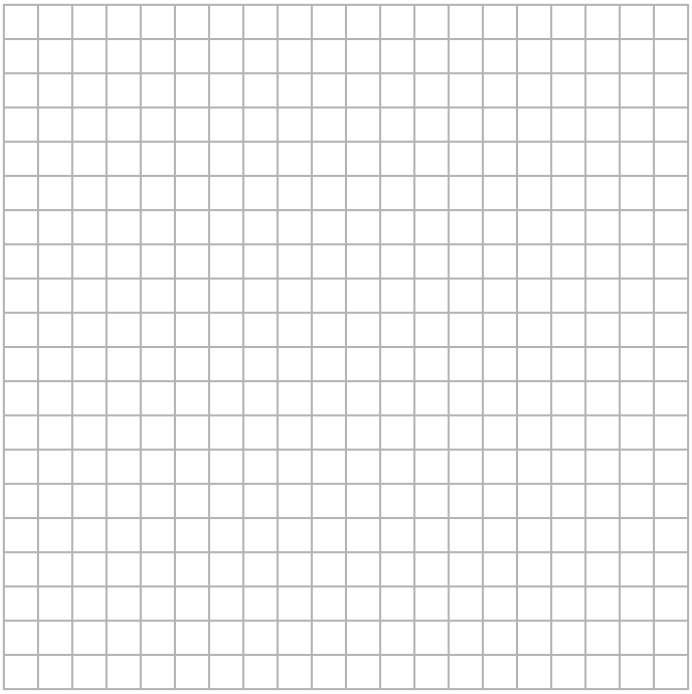
66. Parent Function: $y = \cos x$ (Set mode to Radians)

a) $y = \cos(3x)$ b) $y = \cos\frac{x}{2}$ c) $y = 2\cos(x) + 2$ d) $y = -2\cos x - 1$



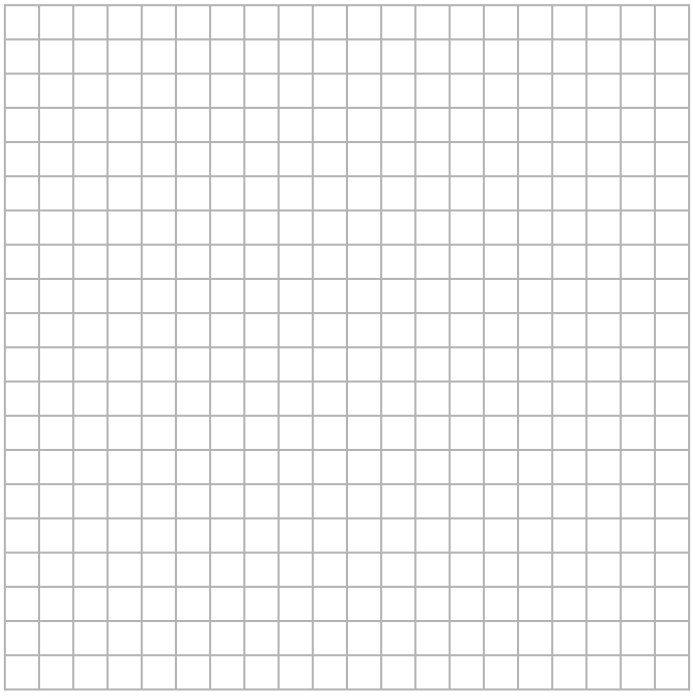
67. Parent Function: $y = x^3$

a) $y = x^3 + 2$ b) $y = -x^3$ c) $y = (x-4)^3$ d) $y = -2(x+2)^3 + 1$



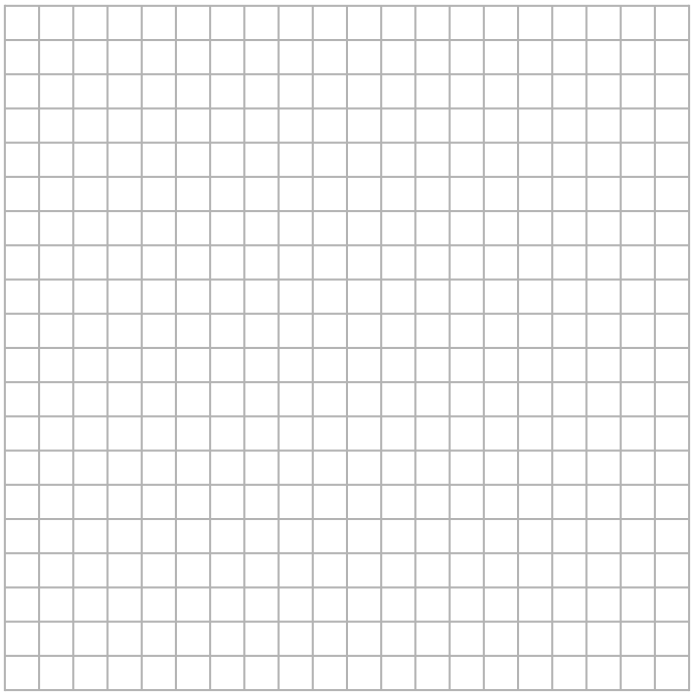
68. Parent Function: $y = \sqrt{x}$

a) $y = \sqrt{x} - 2$ b) $y = \sqrt{-x}$ c) $y = -\sqrt{x}$ d) $y = \sqrt{6-x}$



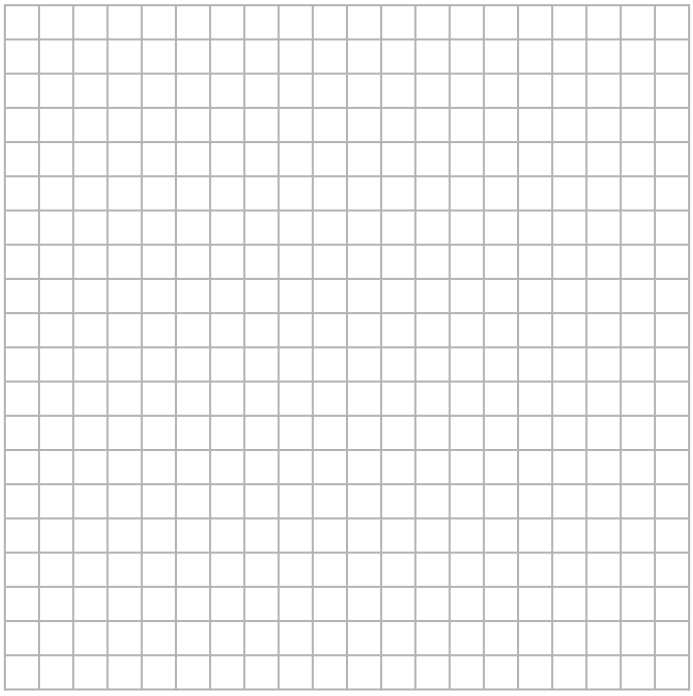
69. Parent Function: $y = \sqrt{x}$

a) $y = -2\sqrt{x}$ b) $y = -\sqrt{4 - x}$ c) $y = -\frac{1}{2}\sqrt{x + 2} - 5$ d) $y = 2\sqrt{x - 3} + 4$



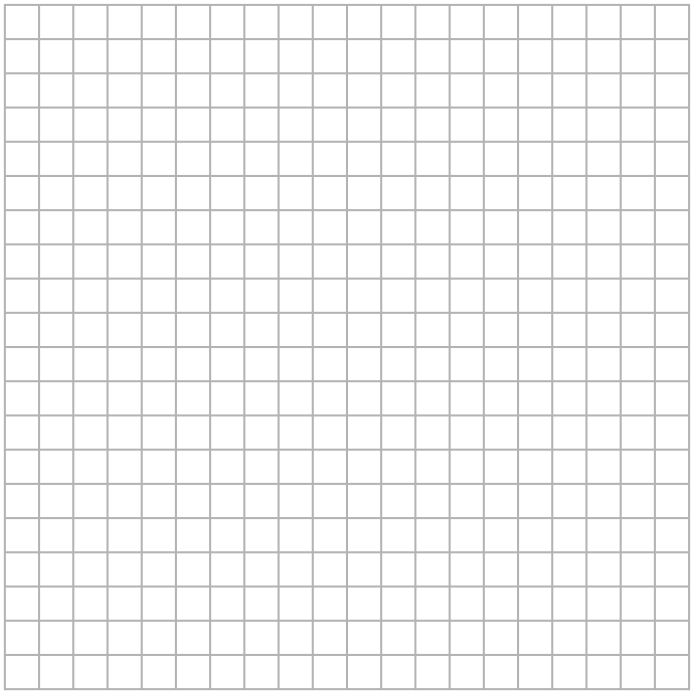
70. Parent Function: $y = \ln x$

a) $y = \ln(x + 3)$ b) $y = \ln(x) + 3$ c) $y = -\ln x$ d) $y = \ln|x|$



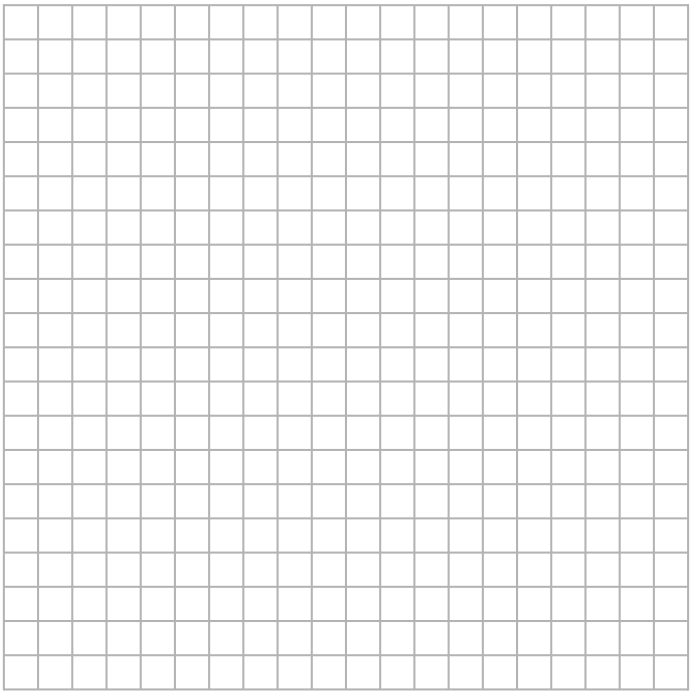
71. Parent Function: $y = e^x$

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: $f(x) = 3\sin(2x) - 4x + 1 \quad from\ [-2\pi, 2\pi]$
    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: $\begin{cases} f(x) = x^2 - 5x + 2 \\ g(x) = 3 - 2x \end{cases}$