Calculus Summer Review Packet

The problems included in this packet are intended to be a review of some of the skills and concepts that you learned in Algebra I, Geometry, Algebra II, and PreCalculus and will need to know to be successful in Calculus. **This assignment should not be a group effort, as students are expected to complete this assignment independently.**

Please do not wait until a day or two before school begins to begin working on this packet. If you plan ahead and work a few pages at a time throughout the summer, this packet should act as a gentle reminder of previously learned material.

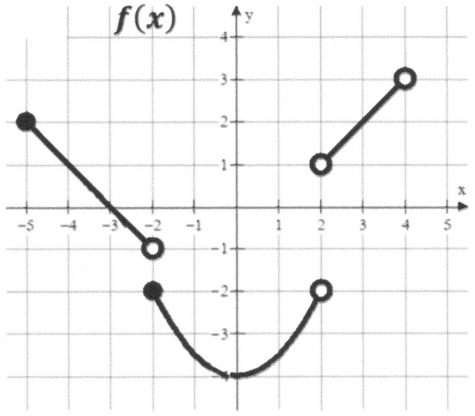
There is not enough room to complete problems on the pages of the packet itself. **Please rewrite each problem and do your work on separate sheets of paper.** You can write on the backs of pages, but please write neatly and clearly. **You must show all of your work.**

This packet must be completed and ready to turn in on the FIRST day of your Calculus class. The work will be counted as three homework grades.

Given: $f(x) = x^2 - 3x + 6$

1. Find f (- 3)
2. Find f (x + 1)
3. Find f (x + h)

Use the graph of f(x) to find the following solutions:



4. f (3)
5. f (-2)
6. f (4)
7. f (2)
8. f (-1)
9. f (0)
10. f (x) = 2 when x = ?
11. f (x) = - 3 when x = ?

Find the equation of the line that meets the following conditions:

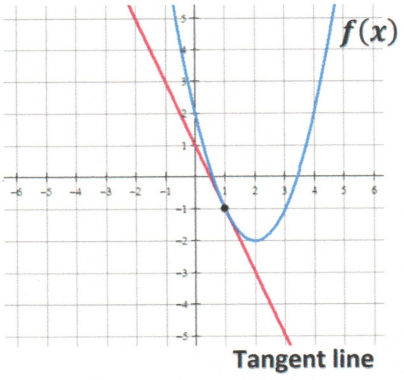
12. Slope: 4

    Passes through the point (4 , - 2)

13. $m = -\frac{3}{2}$ and f (- 5) = 7

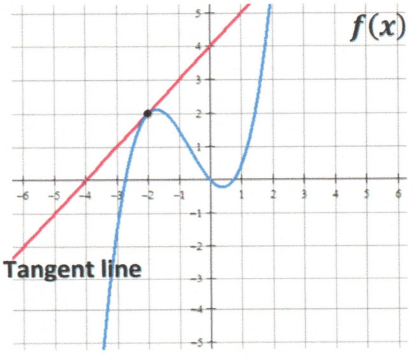
14. f (4) = - 8 and f (- 3) = 12

15. Find the equation of the line tangent to f(x) at x = 1.

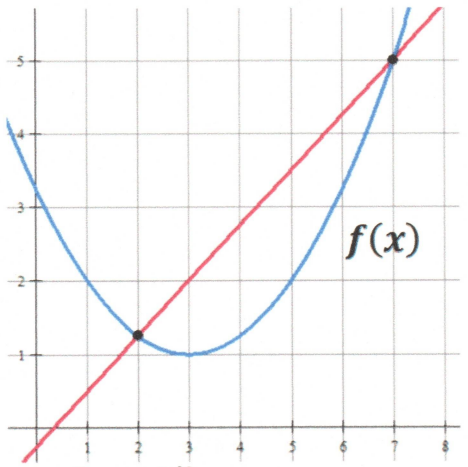


16. Find the equation of the line tangent to f(x) at

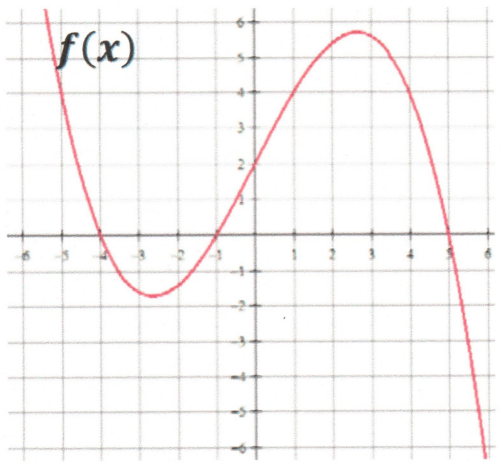
    x = - 2.



17. Find the slope of the secant line.



18. Use the graph of f(x) to answer the following questions:

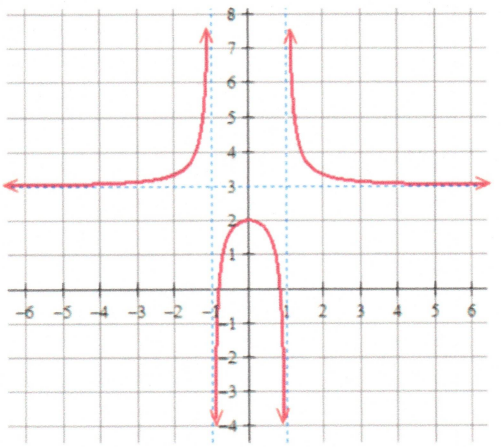


Does f(2) = 0? Why or why not?

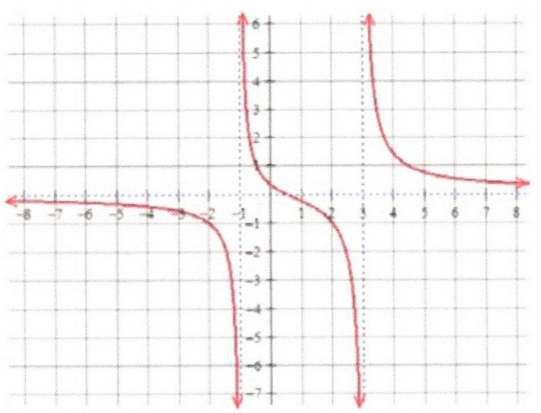
Is (x + 4) a factor of f(x)? Why or why not?

Does f(5) = f(- 1)? Why or why not?

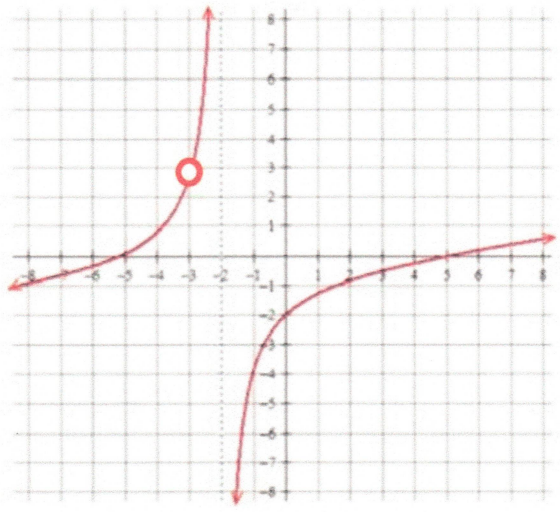
19. Using interval notation, find the domain and range of the following function. Find the equation(s) for horizontal and / or vertical asymptotes.



20. Using interval notation, find the domain and range of the following function. Find the equation(s) for horizontal and / or vertical asymptotes.



21. Using interval notation, find the domain and range of the following function. Find the equation(s) for horizontal and / or vertical asymptotes.



22. Graph $f(x) = \frac{4x}{x-4}$ on the attached graph paper. Include horizontal and / or vertical asymptotes and their equations on your graph.

23. Graph $f(x) = \frac{x^2-5x+6}{x^2-4}$ on the attached graph paper. Include horizontal and / or vertical asymptotes and their equations on your graph.

Rewrite the following expressions using exponents.

24. $\sqrt[5]{x^3} + \sqrt[5]{2x}$

25. $\sqrt{x+1}$

26. $\frac{1}{\sqrt{x+1}}$

27. $\frac{1}{\sqrt{x}} - \frac{2}{x}$

28. $\frac{1}{4x^3} + \frac{1}{2}\sqrt[4]{x^3}$

29. $\frac{1}{2\sqrt{x}} - 2\sqrt{x+1}$

Rewrite each expression in radical form with positive exponents.

30. $x^{-1/2} - x^{3/2}$

31. $\frac{1}{2}x^{-1/2} + x^{-1}$

32. $3x^{-1/2}$

33. $(x+4)^{-1/2}$

34. $x^{-2} + x^{½}$

35. $2x^{-2} + \frac{3}{2}x^{-1}$

Use the attached unit circle to find the following:

36. $\sin\frac{\pi}{6}$

37. $\cos\frac{\pi}{4}$

38. $\sec 2\pi$

39. $\tan \pi$

40. $\csc\frac{\pi}{2}$

41. $\cot\frac{17\pi}{6}$

42. $\sin\frac{-2\pi}{3}$

43. $\cos \frac{7\pi}{2}$

44. $\tan \frac{-7\pi}{4}$

45. $\cot \frac{-3\pi}{2}$

46. $\sec \frac{-3\pi}{4}$

47. $\csc \frac{3\pi}{4}$

48. $\sin -3\pi$

49. $\cos \frac{5\pi}{2}$

50. $\tan \frac{-4\pi}{3}$

Solve the following equations.

51. $e^x + 1 = 2$
52. $3e^x + 5 = 8$
53. $e^{2x} = 1$
54. $\ln x = 0$
55. $3 - \ln x = 3$
56. $\ln(3x) = 0$
57. $x^2 - 3x = 0$
58. $e^x + x\,e^x = 0$
59. $e^{2x} + e^x = 0$

Solve the following equations:

60. $\sin x = \frac{1}{2}$

61. $\cos x = -1$

62. $2 \sin x = -1$

63. $\cos x = \frac{\sqrt{2}}{2}$

64. $\tan x = 0$

Graph the given functions on the attached graph paper. Using interval notation, state the domain and range of each of the given functions.

65. $y = \sqrt{x - 4}$

66. $y = (x - 3)^2$

67. $y = \ln x$

68. $y = e^x$

69. $y = \sqrt{4 - x^2}$

Simplify the following expressions. Show your work or no credit will be given for these problems.

70. $\dfrac{\sqrt{x}}{x}$

71. $e^{\ln x}$

72. $e^{1 + \ln x}$

73. $\ln 1$

74. $\ln e^7$

75. $\log_3 \frac{1}{3}$

76. $\log_2 8$

77. $e^{\ln 1/2}$

78. $(27)^{2/3}$

79. $(5\, a^{2/3})\,(4\, a^{3/2})$

80. $\dfrac{4\, x\, y^{-2}}{12\, x^{-1} y^{-5}}$

81. $(4\, a^{5/3})^{3/2}$

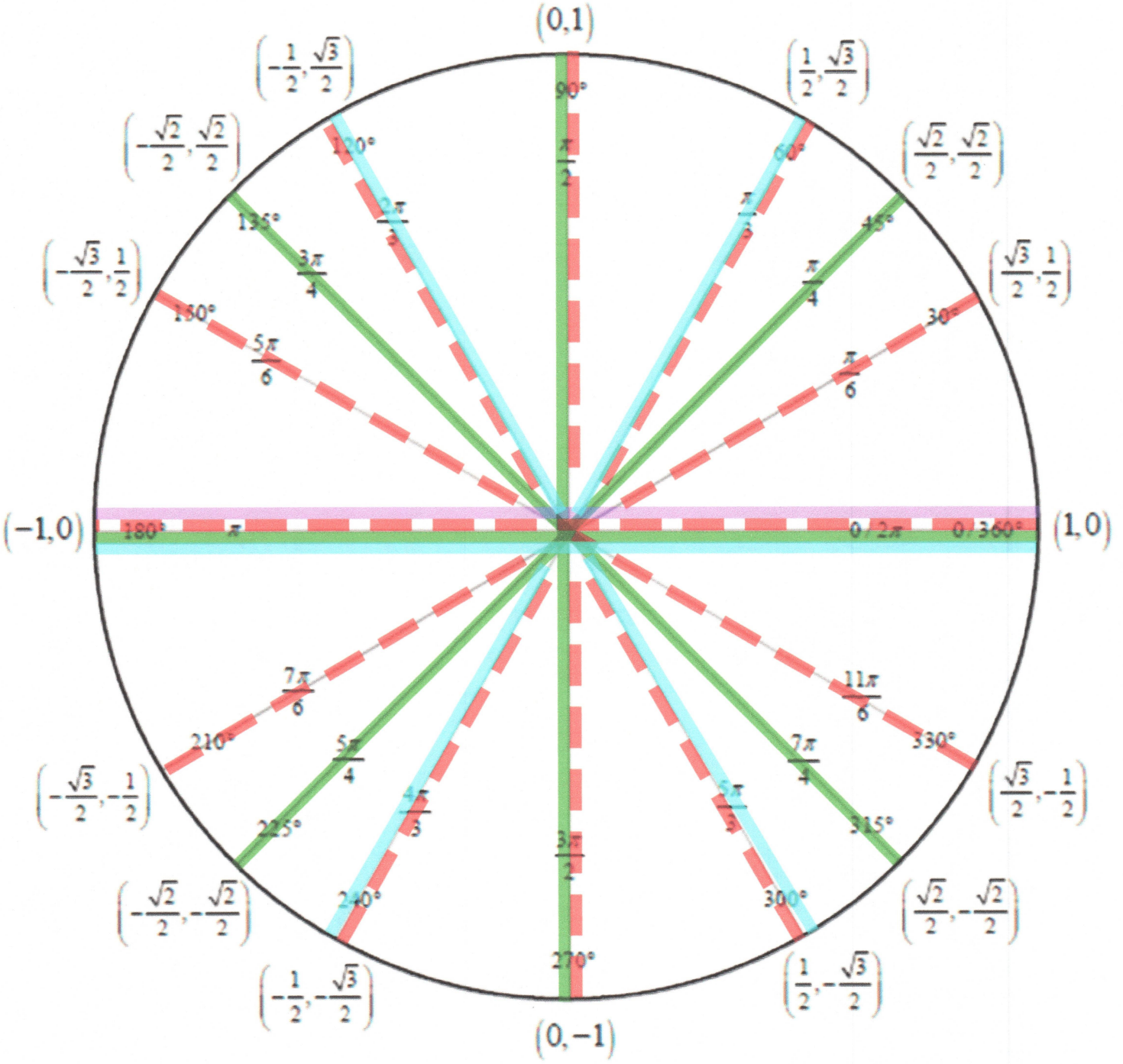
Given: $g(x) = \sqrt{x-3}$

$f(x) = x^2 + 5$

82. Find f(g(x)) and f(g(1)).

83. Find g(f(x)) and g(f(-1)).

84. Graph g(x) on the attached graph paper.
Find the domain and range of g(x).
Find $g^{-1}(x)$.
Graph $g^{-1}(x)$ on the same graph as g(x).
Find the domain and range of $g^{-1}(x)$.
Include a line of symmetry and its equation on your graph.


(0,1)
$\left(-\frac{1}{2},\frac{\sqrt{3}}{2}\right)$
$\left(\frac{1}{2},\frac{\sqrt{3}}{2}\right)$
$\left(-\frac{\sqrt{2}}{2},\frac{\sqrt{2}}{2}\right)$
$\left(\frac{\sqrt{2}}{2},\frac{\sqrt{2}}{2}\right)$
$\left(-\frac{\sqrt{3}}{2},\frac{1}{2}\right)$
$\left(\frac{\sqrt{3}}{2},\frac{1}{2}\right)$
(−1,0)
(1,0)
$\left(-\frac{\sqrt{3}}{2},-\frac{1}{2}\right)$
$\left(\frac{\sqrt{3}}{2},-\frac{1}{2}\right)$
$\left(-\frac{\sqrt{2}}{2},-\frac{\sqrt{2}}{2}\right)$
$\left(\frac{\sqrt{2}}{2},-\frac{\sqrt{2}}{2}\right)$
$\left(-\frac{1}{2},-\frac{\sqrt{3}}{2}\right)$
$\left(\frac{1}{2},-\frac{\sqrt{3}}{2}\right)$
(0,−1)
90°
$\frac{\pi}{2}$
120°
$\frac{2\pi}{3}$
60°
$\frac{\pi}{3}$
135°
$\frac{3\pi}{4}$
45°
$\frac{\pi}{4}$
150°
$\frac{5\pi}{6}$
30°
$\frac{\pi}{6}$
180°
π
0 / 2π
0, 360°
$\frac{7\pi}{6}$
210°
$\frac{11\pi}{6}$
330°
$\frac{5\pi}{4}$
$\frac{7\pi}{4}$
225°
315°
$\frac{4\pi}{3}$
$\frac{5\pi}{3}$
240°
300°
$\frac{3\pi}{2}$
270°

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1. $f(-3) = 24$
2. $f(x+1) = x^2 - 1x + 4$
3. $f(x+h) = x^2 + 2xh + h^2 - 3x - 3h + 6$
4. $f(3) = 2$
5. $f(-2) = -2$
6. $f(4)$ does not exist
7. $f(2)$ does not exist
8. $f(-1) \sim -\frac{7}{2}$
9. $f(0) = -4$
10. $f(x) = 2$ when $x = -5$ and $x = 3$
11. $f(x) = -3$ when $x \approx -\frac{3}{2}$ and $x = \frac{3}{2}$
12. $y = 4x - 18$
13. $y = -\frac{3}{2}x - \frac{1}{2}$
14. $y = -\frac{20}{7}x + \frac{24}{7}$

15. $y = -2x + 1$

16. $y = 1x + 4$

17. $y = \frac{3}{4}x - \frac{1}{4}$ $\quad m = \frac{3}{4}$

18. Does $f(2) = 0$?
No. $f(2) \approx 5.5$
Is $(x+4)$ a factor of $f(x)$?
Yes. $x + 4 = 0$
$x = -4$
pt $(-4, 0)$ is on $f(x)$.
Does $f(5) = f(-1)$?
Yes. $f(5) = 0$ and $f(-1) = 0$

19. Domain: $(-\infty, -1) \cup (-1, 1) \cup (1, +\infty)$
Range: $(-\infty, 2] \cup (3, +\infty)$
Horizontal asymptote: $y = 3$
Vertical asymptotes: $x = -1$, $x = 1$

20. Domain: $(-\infty, -1) \cup (-1, 3) \cup (3, +\infty)$
Range: $(-\infty, +\infty)$
Horizontal asymptote: $y = 0$
* It's possible to cross a horizontal asymptote.
Vertical asymptotes: $x = -1$, $x = 3$

21. Domain : $(-\infty, -3) \cup (-3, -2) \cup (-2, +\infty)$
Range : $(-\infty, +\infty)$
Horizontal asymptote. None
Vertical asymptote : $x = -2$

22. Horizontal asymptote : $y = 4$
Vertical asymptote : $x = 4$

23. Horizontal asymptote : $y = 1$
Vertical asymptote : $x = -2$
Graph is undefined at $x = 2$

24. $x^{3/5} + (2x)^{1/5}$

25. $(x+1)^{1/2}$

26. $(x+1)^{-1/2}$

27. $x^{-1/2} - 2x^{-1}$

28. $\frac{1}{4} x^{-3} + \frac{1}{2} x^{3/4}$

29. $\frac{1}{2} x^{-1/2} - 2(x+1)^{1/2}$

30. $\frac{1}{\sqrt{x}} - x\sqrt{x}$

31. $\frac{1}{2\sqrt{x}} + \frac{1}{x}$

32. $\frac{3}{\sqrt{x}}$

33. $\frac{1}{\sqrt{x+4}}$

34. $\frac{1}{x^2} + \sqrt{x}$

35. $\frac{2}{x^2} + \frac{3}{2x}$

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36. $\frac{1}{2}$

37. $\frac{\sqrt{2}}{2}$

38. 1

39. 0

40. 1

41. $-\sqrt{3}$

42. $-\frac{\sqrt{3}}{2}$

43. 0

44. 1

45. 0

46. $-\sqrt{2}$

47. $\sqrt{2}$

48. 0

49. 0

50. $-\sqrt{3}$

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51. $x = 0$

52. $x = 0$

53. $x = 0$

54. $x = 1$

55. $x = 1$

56. $x = \frac{1}{3}$

57. $x = 0$, $x = 3$

58. $x = -1$

59. No solution

60. $x = \frac{\pi}{6} + 2n\pi$ $x = \frac{5\pi}{6} + 2n\pi$

61. $x = \pi + 2n\pi$

62. $x = \frac{7\pi}{6} + 2n\pi$ $x = \frac{11\pi}{6} + 2n\pi$

63. $x = \frac{\pi}{4} + 2n\pi$ $x = \frac{7\pi}{4} + 2n\pi$

64. $x = 0 + n\pi$
or $x = n\pi$

65-69: Graph functions. Include asymptotes. Use graphs to find domain, range of each function.

70. $\frac{1}{\sqrt{x}}$

71. x

72. e^x

73. 0

74. 7

75. -1

76. 3

77. $\frac{1}{2}$

78. 9

79. $20\, a^{\frac{13}{6}}$

80. $\frac{1}{3} x^2 y^3$

81. $8 a^2 \sqrt{a}$

82. $f(g(x)) = x + 2$

$f(g(1)) = 3$

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

$g(f(-1)) = \sqrt{3}$

84. Can you work this problem without any help?