<table>
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<th>Recommended Pacing:</th>
<th>Objectives</th>
<th>Assignment</th>
<th>Done!</th>
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<tr>
<td><strong>Weeks 1-2:</strong></td>
<td>• Mastery of all prior precalculus and trigonometry concepts</td>
<td>• Watch the video lesson for:</td>
<td>☐</td>
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<tr>
<td><strong>Precalculus:</strong></td>
<td></td>
<td>o Properties of Logs: Part 1</td>
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<tr>
<td><strong>6/20 – 6/30</strong></td>
<td></td>
<td>o Properties of Logs: Part 2</td>
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<td></td>
<td></td>
<td>o Properties of Log Functions</td>
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<td></td>
<td></td>
<td>• Complete Summer Assignment: Problems 1-51 all, 135-139</td>
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<tr>
<td><strong>Weeks 3-4:</strong></td>
<td>• I can find limits of functions from graphs</td>
<td>• Watch the video lessons for:</td>
<td>☐</td>
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<tr>
<td><strong>Limits:</strong></td>
<td>• I can calculate limits as $x$ approaches a real number</td>
<td>o What is a Limit?</td>
<td>☐</td>
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<tr>
<td><strong>7/01 – 7/21</strong></td>
<td>• I can calculate limits involving absolute values</td>
<td>o Finding Limits from a Graph</td>
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<td></td>
<td>• I can use the squeeze theorem to calculate limits</td>
<td>o Calculating a Limit by Factoring and Canceling</td>
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<td></td>
<td></td>
<td>o Calculating a Limit by Expanding and Simplifying</td>
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<td></td>
<td></td>
<td>o Calculating a limit involving $\sin(x)/x$ as $x$ approaches zero</td>
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<td>o Limits Involving Absolute Values</td>
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<td>o The Squeeze Theorem for Limits</td>
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<td>o Properties of Log Functions</td>
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<td>• Complete Summer Assignment: Problems 52 - 64 all, 71 - 82 all</td>
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<td><strong>Week 5:</strong></td>
<td>• I can find limits of functions as $x$ approaches negative or positive infinity</td>
<td>• Watch the video lessons for:</td>
<td>☐</td>
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<tr>
<td><strong>Infinite Limits:</strong></td>
<td>• I can find horizontal asymptotes of rational functions by using infinite limits</td>
<td>o Calculus – Infinite Limits</td>
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<td><strong>7/22 – 7/28</strong></td>
<td></td>
<td>o Limits of Infinity</td>
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<td>o Shortcut to Find Horizontal Asymptotes of Rational Functions</td>
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<td>o Calculating a Limit at Infinity with a Radical</td>
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<td>• Complete Summer Assignment: Problems 65 – 66, 83 – 98, 106 - 110</td>
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<td><strong>Week 6:</strong></td>
<td>• I can determine if a function is continuous (given function or graph)</td>
<td>• Watch the video lesson for:</td>
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<td><strong>Continuity:</strong></td>
<td>• I can find points of discontinuity of a function</td>
<td>o Continuity- Part 1</td>
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<td><strong>7/29 – 8/4</strong></td>
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<td>o Continuity- Part 2</td>
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<td>• Complete Summer Assignment: Problems 67 – 70, 99 - 105</td>
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<td><strong>Week 7:</strong></td>
<td>• I can find the derivative of a function using the limit definition</td>
<td>• Watch the video lesson for:</td>
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<tr>
<td><strong>Intro to Derivative Rules:</strong></td>
<td>• I can sketch the derivative of a function</td>
<td>o Understanding the Definition of the Derivative</td>
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<td><strong>8/5 – 8/11</strong></td>
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<td>o Sketching a Derivative of a Function</td>
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<td>o Finding a Derivative Using the Definition</td>
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<td>• Complete Summer Assignment: Problems 112-114</td>
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<td>• Complete Supplemental Assignment (last page of packet)</td>
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<td>Weeks 8-10:</td>
<td><strong>Derivative Rules:</strong></td>
<td><strong>Watch the video lesson for:</strong></td>
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<tr>
<td><strong>8/12 – 9/1</strong></td>
<td>• I can find the derivative of a function by using the product, quotient, and chain rules</td>
<td>o The Product Rule for Derivatives</td>
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<td></td>
<td>• I can find the equation of a line tangent or normal to a given line</td>
<td>o The Quotient Rule</td>
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<td>o Basic Chain Rule Problems</td>
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<td>o Using the Chain Rule – Harder Example #1</td>
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<td>o Finding the Equation of a Tangent Line</td>
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<td>• Complete Summer Assignment: Problems 115-134 all</td>
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<tr>
<th>First Week of School:</th>
<th><strong>Review of Summer Topics</strong></th>
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<td><strong>8/27 – 8/31</strong></td>
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<td><strong>SUMMER ASSIGNMENT DUE ON THIRD CLASS SESSION</strong></td>
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Calculus BC Summer Assignment

This is the problem set for your summer assignment. It covers topics that you learned in Algebra II, Trigonometry, and Functions. Please be sure to show all of your work – even if you can do some of all of it in your head. You are NOT allowed to use a calculator for the problems unless there is a C next to the problem (#’s 95-98). If you would like feedback from me on the assignment, it must be turned in by Monday, August 19th. It can either be mailed to me here at Patriot High School or brought to the main office to be put in my mailbox. If you choose not to hand it in, the answers will be given out the first day of school and then loaded to fusion. We will go over this assignment during our first class and you will have a test on all the material the second class.

If you have any questions while working on this assignment, you may email me at finnci@pwcs.edu. Enjoy your summer.

Mr. Finn

Write the equation of the line through the two points.
1. (9, 5), (3,5)  
2. (4, -1), (2, 3)  
3. (5, 6), (6, 9)

Write an equation of the line through P that is a) parallel to L, b) perpendicular to L.
4. P(1,2); L: y = -x + 2  
5. P(-1, 3); L: 2x+y = 4  
6. P(4, -7); L: y = 6

For the following functions, a) find the domain, b) find the range, and c) sketch the graph.
7. \( y = 4 - x^2 \)
8. \( y = x^2 - 9 \)
9. \( y = -(x - 3)^2 - 4 \)
10. $y = e^x$

11. $y = \ln x$

\hspace{1cm} a. \\
\hspace{1cm} b. \\

Find the exact value.

12. $\sin \frac{\pi}{4}$
13. $\cos \frac{\pi}{6}$
14. $\tan \frac{\pi}{2}$
15. $\csc \frac{2\pi}{3}$
16. $\sec \frac{5\pi}{4}$

17. $\cot \frac{11\pi}{6}$
18. $\cos \pi$
19. $\sin \frac{3\pi}{2}$
20. $\tan \frac{3\pi}{4}$
21. $\sec \frac{5\pi}{6}$

22. $\csc \frac{7\pi}{4}$
23. $\sin \frac{4\pi}{3}$
24. $\tan \frac{5\pi}{3}$
25. $\csc 0$
26. $\sec \pi$

27. $\cot \frac{5\pi}{3}$
28. $\sin \frac{\pi}{3}$
29. $\cos \frac{3\pi}{4}$
30. $\csc \frac{7\pi}{6}$
31. $\sec \frac{2\pi}{3}$

Find the exact values. If it is an angle, answer the problem in radians, not degrees.

32. $\sin^{-1} \frac{\sqrt{2}}{2}$
33. $\cos^{-1} \frac{1}{2}$
34. $\tan^{-1} 1$
35. $\cot^{-1} \sqrt{3}$

36. $\csc^{-1} -2$
37. $\sec^{-1} -\sqrt{2}$
38. $\sin^{-1} 0$
39. $\cos^{-1} -1$

40. $\cos \left( \sin^{-1} \frac{1}{2} \right)$
41. $\csc \left( \cos^{-1} -\frac{\sqrt{3}}{2} \right)$
42. $\sin \left( \tan^{-1} -\sqrt{3} \right)$
43. $\cos^{-1} \left( \sin \frac{5\pi}{4} \right)$
Find the exact value of each logarithm.

44. \( \log_5 2\sqrt{2} \)  
45. \( \log .001 \)  
46. \( \ln \sqrt{e} \)

Solve the following equations algebraically.

47. \( e^{0.3x} = 9 \)  
48. \( \ln y = 4 \)  
49. \( \log_3 (x-5) - \log_3 (x-1) = 2 \)

Using properties of logarithms to write the logarithmic expression in terms of a single logarithm.

50. \( \frac{1}{3} \log (x+4) - 2 \log x + 5 \log (x-2) \)
51. \( 4 \log a - 3 \log b - \frac{1}{2} \log c \)

Use the graph for questions #52 – 70 to find the limit.

52. \( \lim_{x \to 3^+} f(x) \)  
53. \( \lim_{x \to 3^-} f(x) \)  
54. \( \lim_{x \to 3} f(x) \)

55. \( \lim_{x \to 0} f(x) \)  
56. \( \lim_{x \to 2} f(x) \)  
57. \( \lim_{x \to 2} f(x) \)

58. \( \lim_{x \to 2} f(x) \)  
59. \( f(2) \)  
60. \( \lim_{x \to 1} f(x) \)

61. \( f(1) \)  
62. \( \lim_{x \to 0} f(x) \)  
63. \( \lim_{x \to -2} f(x) \)

64. \( \lim_{x \to -3} f(x) \)  
65. \( \lim_{x \to 0} f(x) \)  
66. \( \lim_{x \to 0} f(x) \)

67. Is \( f(x) \) continuous at \( x = 1 \)?  
68. Is \( f(x) \) continuous at \( x = 2 \)?

69. Is \( f(x) \) continuous at \( x = 0 \)?  
70. Is \( f(x) \) continuous at \( x = -2 \)?
Find the limits.

71. \( \lim \limits_{x \to 2} 7 \)

72. \( \lim \limits_{x \to 3} \frac{3x + 4}{x^2 + 1} \)

73. \( \lim \limits_{x \to 4} (x + 3)^{1904} \)

74. \( \lim \limits_{x \to 3} \frac{x^2 - 9}{x^2 - x - 12} \)

75. \( \lim \limits_{x \to 2} \sqrt[3]{x + 10} \)

76. \( \lim \limits_{x \to 6} (x^2 - 4) \)

77. \( \lim \limits_{x \to -3} \frac{x^4 - 3x^3 + x - 3}{x^3 - 3x^2 + 2x - 6} \)

78. \( \lim \limits_{x \to 0} \frac{5x^3 + 8x^2}{3x^4 - 16x^3} \)

79. \( \lim \limits_{x \to -4} \frac{x^2 + 5x + 4}{x^2 + 3x - 4} \)

80. \( \lim \limits_{x \to 5} \frac{x^2 + 3x - 10}{x + 5} \)

81. \( \lim \limits_{x \to 2} (5x + 6)^3 \)

82. \( \lim \limits_{x \to -1} \frac{x^3 - 1}{x^2 - 1} \)

83. \( \lim \limits_{x \to \infty} \frac{x + 1}{x^2 + 5} \)

84. \( \lim \limits_{x \to \infty} 5 \)

85. \( \lim \limits_{x \to \infty} \frac{4x + 3}{\sqrt{8x^3 - 2}} \)

86. \( \lim \limits_{x \to \infty} \frac{x^4}{x^4 + 1} \)
87. \( \lim_{x \to \infty} \left( \frac{1}{8} \right)^x \)

88. \( \lim_{x \to \infty} \frac{6x - 10 + 4x^2}{x + 10} \)

89. \( \lim_{x \to \infty} \frac{4x^2 - 5x}{3x - 4} \)

90. \( \lim_{x \to \infty} \frac{6x^2 + 5x + 2}{2x^2 - 3} \)

91. \( \lim_{x \to \infty} \frac{3x^3 + 10}{x^2 + 5} \)

92. \( \lim_{x \to \infty} \frac{3x - 14x^2 - 8}{18x^4 + 5x - 18} \)

93. \( \lim_{x \to \infty} (3^x) \)

94. \( \lim_{x \to \infty} \frac{4}{x^3} \)

95. (C) \( \lim_{x \to 1} \frac{\ln(2-x)}{x-1} \)

96. (C) \( \lim_{x \to 0} \frac{\sin x}{x} \)

97. (C) \( \lim_{x \to 9} \frac{3 - \sqrt{x}}{27 - 3x} \)

98. (C) \( \lim_{x \to 0} \frac{\cos x - 1}{x} \)
Determine if the function is continuous. If it is discontinuous, state where and what type.

102. \( y = \begin{cases} x^2 + 3, & x > 1 \\ 3x + 1, & x \leq 1 \end{cases} \)
103. \( y = \frac{x^2 + x - 12}{x^2 + 2x - 15} \)
104. \( y = \frac{4 + x}{x^2 + 1} \)
105. \( y = \frac{x + 4}{2x^2 + x - 3} \)

Find the horizontal and vertical asymptotes for the function.

106. \( y = \frac{2x + 4}{6x - 12} \)  
hor: ______  
ver: ______

107. \( y = \frac{3x + 4}{x^2 + 7x - 18} \)  
hor: ______  
ver: ______

108. \( y = \frac{x^2 - x - 12}{x^2 + 11x + 24} \)  
hor: ______  
ver: ______

109. \( y = \frac{5x + 2}{x^2 - x - 30} \)  
hor: ______  
ver: ______

110. Based upon the graph, find the absolute maximum, absolute minimum, relative maximum, relative minimum, and the intervals of increasing and decreasing.

abs max: ______  
abs min: ______  
rel max: ______  
rel min: ______  
inc: ______  
dec: ______
Use the definition of the derivative \( \lim_{h \to 0} \frac{f(x + h) - f(x)}{h} \) to find the derivative.

112. \( f(x) = 6x - 8 \)  \hspace{1cm} 113. \( f(x) = 3x^2 - 5x - 9 \)

Find the derivative and simplify all answers.

114. \( y = 7x^3 + 3x^2 - 6x + 11 \)  \hspace{1cm} 115. \( y = (7x + 5)^4 \)  \hspace{1cm} 116. \( y = \frac{10}{x^2} \)

117. \( y = (8x^2 - 2)(3x + 7) \)  \hspace{1cm} 118. \( y = \frac{4x + 5}{3x - 6} \)  \hspace{1cm} 119. \( y = \frac{16x^4 + 4x^2}{2x} \)

120. \( y = \sqrt{9x + 4} \)  \hspace{1cm} 121. \( y = 12x^3 + 4x^2 - 17x + 4 \)  \hspace{1cm} 122. \( y = (3x - 4)^2 (x + 5) \)
123. \( y = \frac{8}{\sqrt{x}} \)  
124. \( y = \ln \left( 6x^2 + 5x \right) \)  
125. \( y = e^{4x^2} \)

126. \( y = \cos^3(6x^2) \)  
127. \( y = \ln^4(9x) \)  
128. \( y = \sin(4x^4) \)

129. \( y = \ln(\sqrt{x}) \)  
130. \( y = e^{\tan(2x)} \)  
131. \( y = \csc(10x^2) \)

Write the equation of the tangent line and the normal line to the function.
132. \( y = 2x^2 + 4x - 1 \) at \( x = -1 \)  
133. \( y = 3x^2 + 2x - 1 \) at \( x = 2 \)

Tangent: \_________________________ \  \  \  tangent: \_________________________
Normal: \_________________________ \  \  \  normal: \_________________________

134. Use the intermediate value theorem in the indicated interval and find the value of \( c \) guaranteed by the theorem. \( f(x) = 2x^2 - 7x + 36, \ \ [1, 4], \ f(c) = 33 \)
A parameterization is given for a curve. Graph the curve. What are the initial and terminal points, if any? Indicate the direction in which the curve is traced.

135. \(x = \cos t, \ y = \sin t, \ 0 \leq t \leq \pi\)

136. \(x = t, \ y = 1 - t, \ 0 \leq t \leq 1\)

137. \(x = 4 - t, \ y = t + 1, -\infty < t < \infty\)

Graph the following polar equations.

138. \(r = 2 \sin \theta\)

139. \(r = \cos 3\theta\)