

AP Calculus Summer Assignment **(Mrs. Bender)**

This packet is meant to be completed without a graphing calculator. Your first test for marking period 1 will be on topics from this summer assignment on the first week of school so know how to these problems.

I. Simplify. Final answers must have positive exponents, may be in factored form. No need to rationalize.

1.
$$\frac{x^2 + 4x - 5}{2x^2 - 9x + 7}$$

2.
$$\frac{3x^3 + 81}{54 - 6x^2}$$

3.
$$\frac{1}{x+h} - \frac{1}{x}$$

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

5.
$$\frac{\frac{1}{2x} - \frac{3}{x}}{x^2}$$

6.
$$\frac{\frac{2}{x} - 3}{1 - \frac{1}{x-1}}$$

7.
$$\frac{\frac{1}{x-2} + \frac{1}{2}}{x}$$

8.
$$\frac{\sqrt{x-2} + \frac{5}{\sqrt{x-2}}}{x-2}$$

9.
$$(3x-2)^{\frac{1}{2}} + x(3x-2)^{-\frac{1}{2}}$$

10.
$$\frac{\sqrt{4x-12}}{\sqrt[4]{(x-3)^3}}$$

11.
$$\left(\frac{1}{x^{-2}} + \frac{2}{x^{-1}y^{-1}} + \frac{1}{y^{-2}} \right)^{\frac{1}{2}}$$

12.
$$\left(\frac{x^{-2}}{y^{-1}} - x \right)^{-3}$$

13. $\frac{\sin^2 x + \cos^2 x}{\sin x}$	14. $\frac{1 - (\sin x + \cos x)^2}{2 \sin x}$
15. $\frac{\tan x \sin x + \cos x}{\sec x}$	16. $\frac{\sin^2 x + 3 \sin x + 2}{\sin x + 2}$

II. Write the equation of the line described:

17. Containing the points (2, -3) and (-5, 4)	18. With slope 0 containing the point (3, 7)
19. With x-intercept 3 and y-intercept -4	20. Perpendicular to the line $y = 2x - 1$ passing through the point (4, 9)

III. Factor completely: (don't forget the dummy variable)

21. $2\sqrt{x} - 6x^{\frac{3}{2}}$	22. $2x^4 + 5x^3 - 3x^2$
23. $e^{-x} - xe^{-x} - 2x^2e^{-x}$	24. $4e^{-x} - 3e^x + 4$
25. $x^3 + 5x^2 - 2x - 24$	26. $6x(x-2)^{-1} + 3x^2(x-2) - 12x$
27. $\sin x + \tan x$	28. $3\sin^2 x + \cos^2 x - 3\sin x$

IV. Determine all points of intersection:

<p>29. $x^2 + y = 0$ $x^2 - 4x - y = 0$</p>	<p>30. $y = \sqrt{x-3}$ $y = \frac{3}{4}x - 2$</p>
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V. Graph the following functions then determine the domain and range without using your graphing calculator.

Function	'Rough Graph'	Domain	Range
31. $f(x) = \sqrt{x-2}$			
32. $f(x) = -x^2 - 3$			
33. $f(x) = x^2 - 2x - 8$			
34. $f(x) = \sqrt{25 - x^2}$			
35. $f(x) = e^x$			
36. $f(x) = \ln(x-2)$			
37. $f(x) = 2\sqrt[3]{x+4} - 5$			
38. $f(x) = \sin x$			
39. $f(x) = \cos x$			

VI. Solve for x in the following equations:

40. $x^2 - 8x = 48$	41. $\frac{x-8}{6} = \frac{5}{x+5}$
42. $(x-8)^{\frac{2}{3}} = 9$	43. $\sqrt{x+1} - 3x = 1$
44. $x^3 - 2x^2 - 9x + 18 = 0$	45. $(x-3)^{\frac{1}{3}} - 12(x-3)^{-\frac{1}{3}} = 1$
46. $ x-3 > 8$	47. $\frac{x^2 - 8x}{x^2 - 9} < 0$
48. $x^4 - 12x^3 + 32x^2 \geq 0$	49. $\frac{x}{x+1} > 3$
50. $9^{2x-1} = 27^{5x+3}$	51. $3e^{x-2} = 48$
52. $\log_2 x - \log_2(x+3) = 4$	53. $\ln x + \ln(x-5) = 2 \ln 6$

Solve for x in the interval $0 \leq x \leq 2\pi$	
54. $\csc 2x = \sqrt{2}$	55. $\sin x = \sqrt{3} \cos x$
56. $2 \sin^2 x = \sin x$	57. $2 \cos^2 x + \sin x - 1 = 0$

VII. Unit Circle Practice

58. $\sin \frac{\pi}{2}$	59. $\cos \frac{3\pi}{4}$	60. $\tan \frac{4\pi}{3}$	61. $\csc \frac{7\pi}{6}$
62. $\sec \frac{5\pi}{3}$	63. $\cot \frac{3\pi}{2}$	64. $\cos \pi$	65. $\tan 2\pi$
66. $\sin^{-1} \frac{\sqrt{3}}{2}$	67. $\tan^{-1}(-1)$	68. $\sec^{-1}(-2)$	69. $\csc^{-1} \frac{2\sqrt{3}}{3}$
70. $\tan \left(\sin^{-1} \left(-\frac{1}{2} \right) \right)$	71. $\sin^{-1}(\cot(-1))$	72. $\sin \left(\cos^{-1} \frac{\sqrt{3}}{2} \right)$	73. $\sin(\sec^{-1}(-\sqrt{2}))$
74. $\sin \left(\tan^{-1} \left(\frac{4}{3} \right) \right)$	75. $\cot(\cos^{-1} x)$		

VIII. Graph the following: (Key points / features must be shown in your graph – vertex, any rational x -intercept, y -intercept, asymptotes, arrows)

76. $f(x) = \frac{1-x^2}{x^2-2x-15}$	77. $f(x) = -(x+2)(x-1)^2(x-4)$	78. $\frac{(x-3)^2}{9} - \frac{(y+2)^2}{16} = 1$
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