

Name \_\_\_\_\_

## Advanced Placement Calculus AB Summer Assignment

The following is the required AP Summer Assignment for AP Calculus AB. Most questions in this packet were included because they involve skills and concepts that will be used extensively in AB calculus next year, and not retaught. Others are included NOT because they are frequently used skills, but because being able to solve them indicates a strong grasp of important mathematical concepts, and more importantly the ability to problem solve. AB Calculus is a challenging, demanding, and rewarding math course!

This will be **collected the first day** of school in September and be used as the first quiz grade of the school year. Students who do not complete or arrive at school without this assignment in September will receive a zero (0/20) for the first quiz. Since most of the questions cannot be done without work, a ten (10/20) will be the score if the supporting work for each problem is not submitted. Simply completing the assignment, and submitting all supporting work will earn a score of twenty (20/20). **All work must be neatly organized. Calculator use is not permitted.** If you have any questions about this assignment, they may be directed to Mrs. Covington in Room 439 on or before June. Enjoy your summer and see you in September!!

Name: \_\_\_\_\_

Simplify the following:

1.  $\frac{3}{4x^2-25} + \frac{2}{2x+5}$

2.  $\frac{8}{y-2} - \frac{3y}{2y^2-8}$

3.  $\frac{30x^2+53x+22}{70x^2+17x-66}$

Let  $f(x) = 2x + 1$  and  $g(x) = 2x^2 - 1$ . Find each.

4.  $f(2)$

5.  $g(-3)$

6.  $f(h + 1)$

7.  $f[g(-2)]$

8.  $g[f(m + 2)]$

9.  $[f(x)]^2 - 2g(x)$

Let  $f(x) = \sin(2x)$ . Find each EXACT value.

10.  $f\left(\frac{\pi}{4}\right)$

11.  $f\left(\frac{2\pi}{3}\right)$

12.  $f\left(-\frac{\pi}{6}\right)$

Let  $f(x) = x^2$ ,  $g(x) = 2x + 5$ , and  $h(x) = x^2 - 1$ . Find each.

13.  $h[f(-2)]$

14.  $f[g(x - 1)]$

15.  $g[h(x^3)]$

Find the x and y intercepts for each of the following functions:

16.  $y = 2x - 5$

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

18.  $y = x\sqrt{16 - x^2}$

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

Find the point(s) of intersection of the graphs for the given equations.

20.  $x+y=8$   
 $4x-y=7$

21.  $x^2+y=6$   
 $x+y=4$

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

Find the domain and range of the following functions. Write your answers in INTERVAL NOTATION.

23.  $f(x) = x^2 - 5$

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

25.  $f(x) = 3 \sin x$

26.  $f(x) = \frac{2}{x-1}$

Find the inverse for each function.

27.  $f(x) = 2x + 1$

28.  $f(x) = \frac{x^2}{3}$

29.  $g(x) = \frac{5}{x-2}$

30.  $y = \sqrt{4-x} + 1$

31. If the graph of  $f(x)$  has the point  $(2, 7)$  then what is one point that will be on the graph of  $f^{-1}(x)$ ?

32. Explain, in words, how the graphs of  $f(x)$  and  $f^{-1}(x)$  compare.

33. Determine the equation of a line passing through the point  $(5, -3)$  with an undefined slope.

34. Determine the equation of a line passing through the point  $(4, -2)$  with a slope of 0.

35. Use point-slope form to find the equation of the line passing through the point  $(0, 5)$  with a slope of  $2/3$ .

36. Use point-slope form to find a line passing through the point  $(2, 8)$  and parallel to the line  $y = \frac{5}{6}x - 1$

36 a) Use point-slope form to find a line perpendicular to  $y = -2x + 9$  passing through the point  $(4, 7)$ .

For #37-39 find the partial fraction decomposition:

37.  $\frac{2x-1}{(x-2)(x-3)}$

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

39.  $\frac{x+7}{x^2-x-6}$

Determine the exact value of the following. DO NOT use a calculator.

40.  $\sin \pi$

41.  $\cos \frac{3\pi}{2}$

42.  $\sin \left(-\frac{\pi}{2}\right)$

43.  $\sin \left(\frac{5\pi}{4}\right)$

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

45.  $\cos(-\pi)$

46.  $\cos \left(\frac{\pi}{3}\right)$

47.  $\sin \frac{5\pi}{6}$

48.  $\cos \frac{2\pi}{3}$

49.  $\tan \left(\frac{\pi}{4}\right)$

50.  $\tan \pi$

51.  $\tan \left(\frac{\pi}{3}\right)$

52.  $\cos \frac{4\pi}{3}$

53.  $\sin \frac{11\pi}{6}$

54.  $\tan \frac{7\pi}{4}$

55.  $\sin \left(-\frac{\pi}{6}\right)$

Solve each of the equations for  $0 \leq x \leq 2\pi$ .

56.  $\sin x = -\frac{1}{2}$

57.  $2 \cos x = \sqrt{3}$

58.  $4 \sin^2 x = 3$

\*Recall  $\sin^2 x = (\sin x)^2$

59.  $2 \sin^2 x - 3 \sin x - 2 = 0$

60.  $\cos^2 x = 1 - \sin x$

61.  $\sin x - 2 \sin x \cos x = 0$

62. Given  $f(x) = x^2$  and  $g(x) = (x - 3)^2 + 1$ , how does the graph of  $g(x)$  differ from  $f(x)$  in terms of transformations of functions?

63. Write an equation for the function that has the shape of  $f(x) = x^3$  but moved six units to the left and reflected over the x-axis.

Find the vertical asymptotes for the following functions:

64.  $f(x) = \frac{1}{x^2}$

65.  $f(x) = \frac{x^2}{x^2-4}$

66.  $f(x) = \frac{2+x}{x^2(1-x)}$

67.  $f(x) = \frac{4-x}{x^2-16}$

68.  $f(x) = \frac{x-1}{x^2+x-2}$

69.  $f(x) = \frac{5x+20}{x^2-16}$

Find the horizontal asymptotes for the following functions:

70.  $f(x) = \frac{x^2-2x+1}{x^3+x-7}$

71.  $f(x) = \frac{5x^3-2x+8}{4x-3x^3+5}$

72.  $\frac{4x^2}{3x^2-7}$

73.  $f(x) = \frac{(2x-5)^2}{x^2-x}$

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

\*\*\*Remember  $\sqrt{x^2} = \pm x$

Solve the following equations to find the value of  $x$ .

75.  $3^{3x-5} = 9^{2x+1}$

76.  $\left(\frac{1}{9}\right)^x = 27^{2x+4}$

77.  $\left(\frac{1}{6}\right)^x = 216$

Evaluate the following logarithms. Use the exponential definition of a logarithm to help you.

78.  $\log_7 7$

79.  $\log_3 27$

80.  $\log_2 \frac{1}{32}$

81.  $\log_{25} 5$

82.  $\log_9 1$

83.  $\log_4 8$

84.  $\ln \sqrt{e}$

85.  $\ln \frac{1}{e}$

86.  $\ln 0$

Solve each logarithmic or exponential equation below. Give exact answers.

$$87. \log_{20}(8 - 2x) = \log_{20}(-3x + 10)$$

$$88. 5 \ln(b - 9) = 20$$

$$89. 3 \log_4(4n - 5) + 4 = 7$$

$$90. \log(x + 21) + \log x = 2$$

$$91. 5^{2x} = 20$$

$$92. 4 - 2e^{x+1} = -12$$

State whether the following functions are even, odd, or neither. Show your work to explain your answer.

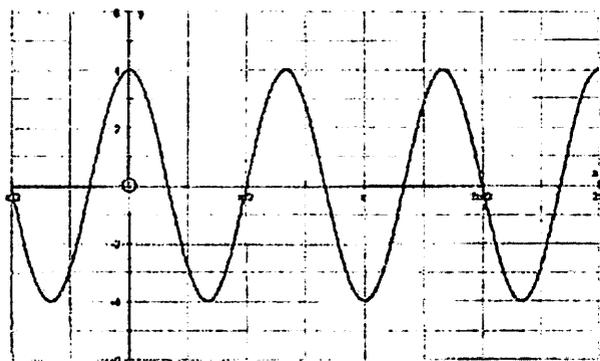
93.  $y = 2x^4 - 5x^2$

94.  $g(x) = x^5 - 3x^3 + x$

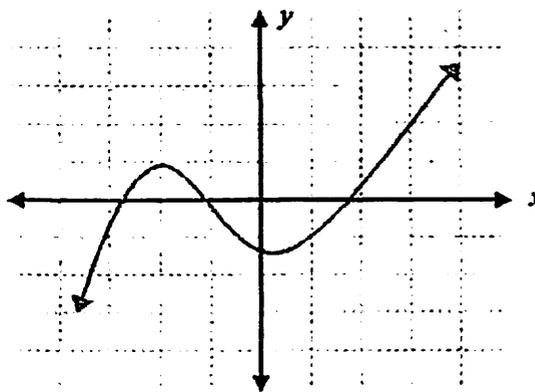
95.  $h(x) = 2x^2 - 5x + 3$

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

97.

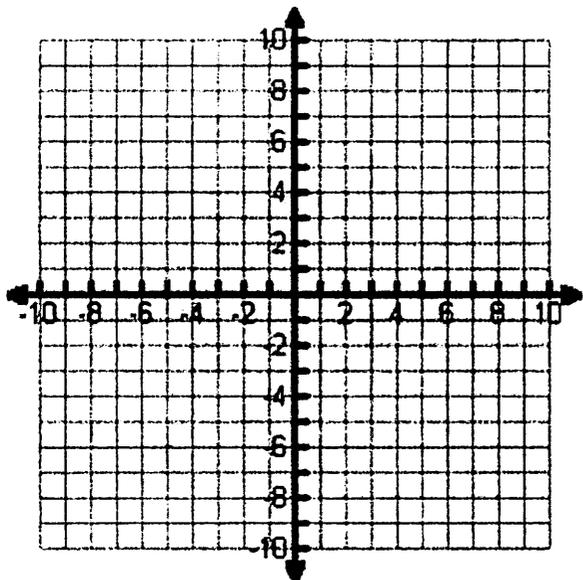


98.



Graph each of the following piecewise functions. Determine any points of discontinuity.

99.  $f(x) = \begin{cases} x + 5; & x \leq 2 \\ -4; & x > 2 \end{cases}$



100.  $f(x) = \begin{cases} x - 1; & x \leq -2 \\ 2x - 1; & -2 < x \leq 4 \\ -3x + 8; & x > 4 \end{cases}$

