



AP Calculus AB Summer Assignment

Course: Advanced Placement Calculus AB

Textbook: Larson, Ron, and Bruce H. Edwards. *Calculus*. 10e AP Edition ed. Belmont, CA: Brooks/Cole, Cengage Learning, 2014.

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Welcome to AP Calculus AB. I am looking forward to an exciting school year of learning Calculus with every single one of you. As a college level course, AP Calculus is both challenging and rewarding. To get ready for the course, students are asked to complete the following packet before the first day of school. Come to class the first day of school with your assignment completed and ready with any questions. I am excited to be working with all of you in the upcoming school year.

AP Calculus AB Summer Assignment:

- ❖ Students must know the unit circle and the values of the six trigonometric functions corresponding to the angles measures on the unit circle.
- ❖ Complete the attached packet.

AP Calculus AB summer packet

Complete all work on paper. Show all work. If work is not shown, full credit may not be given.
Do not use a calculator unless directions explicitly instruct.

In exercises 1-10, sketch the equation:

1. $y = \frac{1}{2}x + 2$
2. $y = 5 - 2x$
3. $y = 4 - x^2$
4. $y = (x - 3)^2$
5. $y = |x + 2|$
6. $y = |x| - 1$
7. $y = \sqrt{x} - 6$
8. $y = \sqrt{x + 2}$
9. $y = \frac{3}{x}$
10. $y = \frac{1}{x+2}$

In exercises 11-20, find any intercepts:

11. $y = 2x - 5$
12. $y = 4x^2 + 3$
13. $y = x^2 + x - 2$
14. $y^2 = x^3 - 4x$
15. $y = x\sqrt{16 - x^2}$
16. $y = (x - 1)\sqrt{x^2 + 1}$
17. $y = \frac{2 - \sqrt{x}}{5x + 1}$
18. $y = \frac{x^2 + 3x}{(3x + 1)^2}$
19. $x^2y - x^2 + 4y = 0$
20. $y = 2x - \sqrt{x^2 + 1}$

In exercises 21-32, test for symmetry with respect to each axis and to the origin:

21. $y = x^2 - 6$
22. $y = x^2 - x$
23. $y^2 = x^3 - 8x$
24. $y = x^3 + x$
25. $xy = 4$
26. $xy^2 = -10$
27. $y = 4 - \sqrt{x + 3}$

$$28. xy - \sqrt{4 - x^2} = 0$$

$$29. y = \frac{x}{x^2 + 1}$$

$$30. y = \frac{x^2}{x^2 + 1}$$

$$31. y = |x^3 + x|$$

$$32. |y| - x = 3$$

In exercises 33-50, find any intercepts and test for symmetry. Then sketch the graph of the equation:

$$33. y = 2 - 3x$$

$$34. y = \frac{2}{3}x + 1$$

$$35. y = 9 - x^2$$

$$36. y = 2x^2 + x$$

$$37. y = x^3 + 2$$

$$38. y = x^3 - 4x$$

$$39. y = x\sqrt{x + 5}$$

$$40. y = \sqrt{25 - x^2}$$

$$41. x = y^3$$

$$42. x = y^2 - 4$$

$$43. y = \frac{8}{x}$$

$$44. y = \frac{10}{x^2 + 1}$$

$$45. y = 6 - |x|$$

$$46. y = |6 - x|$$

$$47. y^2 - x = 9$$

$$48. x^2 + 4y^2 = 4$$

$$49. x + 3y^2 = 6$$

$$50. 3x - 4y^2 = 8$$

In exercises 51-56, find the points of intersection of the graphs of the equations:

$$51. x + y = 8 \text{ and } 4x - y = 7$$

$$52. 3x - 2y = -4 \text{ and } 4x + 2y = -10$$

$$53. x^2 + y = 6 \text{ and } x + y = 4$$

$$54. x = 3 - y^2 \text{ and } y = x - 1$$

$$55. x^2 + y^2 = 5 \text{ and } x - y = 1$$

$$56. x^2 + y^2 = 25 \text{ and } -3x + 5 = 15$$

In exercises 57-60, use a calculator to find the points of intersection of the graphs. Then check your results analytically:

57. $y = x^3 - 2x^2 + x - 1$ and $y = -x^2 + 3x - 1$

58. $y = x^4 - 2x^2 + 1$ and $y = 1 - x^2$

59. $y = \sqrt{x + 6}$ and $\sqrt{-x^2 - 4x}$

60. $y = -|2x - 3| + 6$ and $y = 6 - x$

In exercises 61-66, find the slope of the line passing through the pair of points:

61. $(3, -4), (5, 2)$

62. $(1, 1), (-2, 7)$

63. $(4, 6), (4, 1)$

64. $(3, -5), (5, -5)$

65. $\left(-\frac{1}{2}, \frac{2}{3}\right), \left(-\frac{3}{4}, \frac{1}{6}\right)$

66. $\left(\frac{7}{8}, \frac{3}{4}\right), \left(\frac{5}{4}, -\frac{1}{4}\right)$

In exercises 67-72, find an equation of the line that passes through the point and has the indicated slope:

67. Point: $(0, 3)$ Slope: $m = \frac{3}{4}$

68. Point: $(-5, -2)$ Slope: $m = \frac{2}{3}$

69. Point: $(0, 0)$ Slope: m is undefined

70. Point: $(0, 4)$ Slope: $m = 0$

71. Point: $(3, -2)$ Slope: $m = 3$

72. Point: $(-2, 4)$ Slope: $m = -\frac{3}{5}$

In exercises 73-78, find the slope and the y -intercept (if possible) of the line:

73. $y = 4x - 3$

74. $-x + y = 1$

75. $x + 5y = 20$

76. $6x - 5y = 15$

77. $x = 4$

78. $y = -1$

In exercises 79-86, find an equation of the line that passes through the pair of points:

79. $(0, 0), (4, 8)$

80. $(-2, 2), (1, 7)$

- 81. $(2,8), (5,0)$
- 82. $(-3,6), (1,2)$
- 83. $(6,3), (6,8)$
- 84. $(1, -2), (3, -2)$
- 85. $\left(\frac{1}{2}, \frac{7}{2}\right), \left(0, \frac{3}{4}\right)$
- 86. $\left(\frac{7}{8}, \frac{3}{4}\right), \left(\frac{5}{4}, -\frac{1}{4}\right)$

In exercises 87-94, write the general forms of the equations of the lines through the point (a) parallel to the given line and (b) perpendicular to the given line:

- 87. Point: $(-7, -2)$ Line: $x = 1$
- 88. Point: $(-1,0)$ Line: $y = -3$
- 89. Point: $(2,5)$ Line: $x - y = -2$
- 90. Point: $(-3,2)$ Line: $x + y = 7$
- 91. Point: $(2,1)$ Line: $4x - 2y = 3$
- 92. Point: $\left(\frac{5}{6}, -\frac{1}{2}\right)$ Line: $7x + 4y = 8$
- 93. Point: $\left(\frac{3}{4}, \frac{7}{8}\right)$ Line: $5x - 3y = 0$
- 94. Point: $(4, -5)$ Line: $3x + 4y = 7$

In exercises 95-100, evaluate the function at the given value(s) of the independent variable. Simply the results:

- 95. $f(x) = 7x - 4$
 - a. $f(0)$
 - b. $f(-3)$
 - c. $f(b)$
 - d. $f(x - 1)$

- 96. $f(x) = \sqrt{x + 5}$
 - a. $f(-4)$
 - b. $f(11)$
 - c. $f(4)$
 - d. $f(x + \Delta x)$

- 97. $g(x) = 5 - x^2$
 - a. $g(0)$
 - b. $g(\sqrt{5})$
 - c. $g(-2)$
 - d. $g(t - 1)$

98. $g(x) = x^2(x - 4)$

- a. $g(4)$
- b. $g\left(\frac{3}{2}\right)$
- c. $g(c)$
- d. $g(t + 4)$

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

- a. $f(0)$
- b. $f\left(-\frac{\pi}{4}\right)$
- c. $f\left(\frac{\pi}{3}\right)$
- d. $f(\pi)$

100. $f(x) = \sin x$

- a. $f(\pi)$
- b. $f\left(\frac{5\pi}{4}\right)$
- c. $f\left(\frac{2\pi}{3}\right)$
- d. $f\left(-\frac{\pi}{6}\right)$

In exercises 101-108, find the domain and range of the function:

101. $f(x) = 4x^2$

102. $f(x) = 4 - x^2$

103. $g(x) = \sqrt{6x}$

104. $h(x) = -\sqrt{x + 3}$

105. $f(x) = |x - 3|$

106. $f(t) = \sec \frac{\pi t}{4}$

107. $h(t) = \cot t$

108. $f(x) = \frac{x-2}{x+4}$

In exercises 109-114, find the domain of the function:

109. $f(x) = \sqrt{x} + \sqrt{1 - x}$

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

111. $g(x) = \frac{2}{1 - \cos x}$

112. $h(x) = \frac{1}{\sin x - \left(\frac{1}{2}\right)}$

113. $f(x) = \frac{1}{|x+3|}$

$$114. \quad g(x) = \frac{1}{|x^2-4|}$$

In exercises 115-118, evaluate the function as indicated:

$$115. \quad \begin{cases} 2x + 1, x < 0 \\ 2x + 2, x \geq 0 \end{cases}$$

- a. $f(-1)$
- b. $f(0)$
- c. $f(2)$
- d. $f(t^2 + 1)$

$$116. \quad \begin{cases} x^2 + 2, x \leq 1 \\ 2x^2 + 2, x > 1 \end{cases}$$

- a. $f(-2)$
- b. $f(0)$
- c. $f(1)$
- d. $f(s^2 + 2)$

$$117. \quad \begin{cases} |x| + 1, x < 1 \\ -x + 1, x \geq 1 \end{cases}$$

- a. $f(-3)$
- b. $f(1)$
- c. $f(3)$
- d. $f(b^2 + 1)$

$$118. \quad \begin{cases} \sqrt{x+4}, x \leq 5 \\ (x-5)^2, x > 5 \end{cases}$$

- a. $f(-3)$
- b. $f(0)$
- c. $f(5)$
- d. $f(10)$

In exercises 119-122, sketch the graph of the function and determine its domain and range:

$$119. \quad f(x) = \frac{4}{x}$$

$$120. \quad f(x) = \frac{1}{4}x^3 + 3$$

$$121. \quad f(x) = x + \sqrt{4 - x^2}$$

122. $g(t) = 3 \sin \pi t$

123. Given $f(x) = \sqrt{x}$ and $g(x) = x^2 - 1$, evaluate each expression:

- a. $f(g(1))$
- b. $g(f(1))$
- c. $g(f(0))$
- d. $f(g(-4))$
- e. $f(g(x))$
- f. $g(f(x))$

124. Given $f(x) = \sin x$ and $g(x) = \pi x$, evaluate each expression:

- a. $f(g(2))$
- b. $g\left(f\left(\frac{1}{2}\right)\right)$
- c. $g(f(0))$
- d. $g\left(f\left(\frac{\pi}{4}\right)\right)$
- e. $f(g(x))$
- f. $g(f(x))$