

AP Calculus Summer Work 2018

We skip the prerequisite chapter in AP Calculus. Your assignment will be to do the review questions for that chapter. You may use a calculator. I work summer school so if you have any questions please come up and ask.

Chapter 1

Review Exercises

In Exercises 1–14, write an equation for the specified line.

1. through $(1, -6)$ with slope 3
2. through $(-1, 2)$ with slope $-1/2$
3. the vertical line through $(0, -3)$
4. through $(-3, 6)$ and $(1, -2)$
5. the horizontal line through $(0, 2)$
6. through $(3, 3)$ and $(-2, 5)$
7. with slope -3 and y -intercept 3
8. through $(3, 1)$ and parallel to $2x - y = -2$
9. through $(4, -12)$ and parallel to $4x + 3y = 12$
10. through $(-2, -3)$ and perpendicular to $3x - 5y = 1$
11. through $(-1, 2)$ and perpendicular to $\frac{1}{2}x + \frac{1}{3}y = 1$
12. with x -intercept 3 and y -intercept -5
13. the line $y = f(x)$, where f has the following values:

x	-2	2	4
$f(x)$	4	2	1

14. through $(4, -2)$ with x -intercept -3

In Exercises 15–18, determine whether the graph of the function is symmetric about the y -axis, the origin, or neither.

15. $y = x^{1/5}$
16. $y = x^{2/5}$
17. $y = x^2 - 2x - 1$
18. $y = e^{-x^2}$

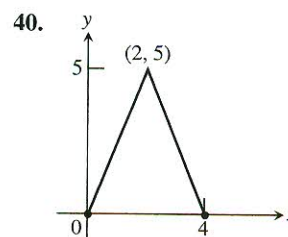
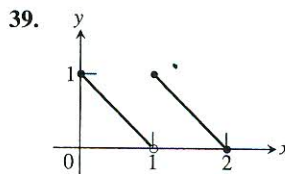
In Exercises 19–26, determine whether the function is even, odd, or neither.

19. $y = x^2 + 1$
20. $y = x^5 - x^3 - x$
21. $y = 1 - \cos x$
22. $y = \sec x \tan x$
23. $y = \frac{x^4 + 1}{x^3 - 2x}$
24. $y = 1 - \sin x$
25. $y = x + \cos x$
26. $y = \sqrt{x^4 - 1}$

In Exercises 27–38, find the (a) domain and (b) range, and (c) graph the function.

27. $y = |x| - 2$
28. $y = -2 + \sqrt{1 - x}$
29. $y = \sqrt{16 - x^2}$
30. $y = 3^{2-x} + 1$
31. $y = 2e^{-x} - 3$
32. $y = \tan(2x - \pi)$
33. $y = 2 \sin(3x + \pi) - 1$
34. $y = x^{2/5}$
35. $y = \ln(x - 3) + 1$
36. $y = -1 + \sqrt[3]{2 - x}$
37. $y = \begin{cases} \sqrt{-x}, & -4 \leq x \leq 0 \\ \sqrt{x}, & 0 < x \leq 4 \end{cases}$
38. $y = \begin{cases} -x - 2, & -2 \leq x \leq -1 \\ x, & -1 < x \leq 1 \\ -x + 2, & 1 < x \leq 2 \end{cases}$

In Exercises 39 and 40, write a piecewise formula for the function.



In Exercises 41 and 42, find

- (a) $(f \circ g)(-1)$
- (b) $(g \circ f)(2)$
- (c) $(f \circ f)(x)$
- (d) $(g \circ g)(x)$

41. $f(x) = \frac{1}{x}$, $g(x) = \frac{1}{\sqrt{x+2}}$

42. $f(x) = 2 - x$, $g(x) = \sqrt[3]{x+1}$

In Exercises 43 and 44, (a) write a formula for $f \circ g$ and $g \circ f$ and find the (b) domain and (c) range of each.

43. $f(x) = 2 - x^2$, $g(x) = \sqrt{x+2}$

44. $f(x) = \sqrt{x}$, $g(x) = \sqrt{1-x}$

In Exercises 45–48, a parametrization is given for a curve.

(a) Graph the curve. Identify the initial and terminal points, if any. Indicate the direction in which the curve is traced.

(b) Find a Cartesian equation for a curve that contains the parametrized curve. What portion of the graph of the Cartesian equation is traced by the parametrized curve?

45. $x = 5 \cos t$, $y = 2 \sin t$, $0 \leq t \leq 2\pi$
46. $x = 4 \cos t$, $y = 4 \sin t$, $\pi/2 \leq t < 3\pi/2$
47. $x = 2 - t$, $y = 11 - 2t$, $-2 \leq t \leq 4$
48. $x = 1 + t$, $y = \sqrt{4 - 2t}$, $t \leq 2$

In Exercises 49–52, give a parametrization for the curve.

49. the line segment with endpoints $(-2, 5)$ and $(4, 3)$
50. the line through $(-3, -2)$ and $(4, -1)$
51. the ray with initial point $(2, 5)$ that passes through $(-1, 0)$
52. $y = x(x - 4)$, $x \leq 2$

In Exercises 53 and 54, work in groups of two or three to (a) find f^{-1} and show that $(f \circ f^{-1})(x) = (f^{-1} \circ f)(x) = x$. (b) graph f and f^{-1} in the same viewing window.

53. $f(x) = 2 - 3x$

54. $f(x) = (x + 2)^2$, $x \geq -2$

In Exercises 55 and 56, find the measure of the angle in radians and degrees.

55. $\sin^{-1}(0.6)$

56. $\tan^{-1}(-2.3)$

57. Find the six trigonometric values of $\theta = \cos^{-1}(3/7)$. Give exact answers.

58. Solve the equation $\sin x = -0.2$ in the following intervals.

(a) $0 \leq x < 2\pi$

(b) $-\infty < x < \infty$

59. Solve for x : $e^{-0.2x} = 4$

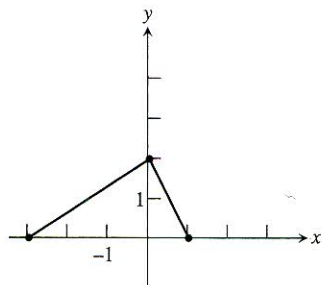
60. The graph of f is shown. Draw the graph of each function.

(a) $y = f(-x)$

(b) $y = -f(x)$

(c) $y = -2f(x+1) + 1$

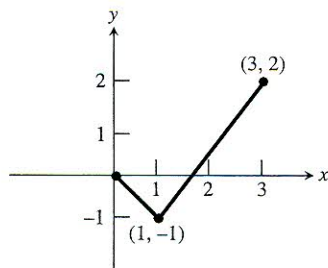
(d) $y = 3f(x-2) - 2$



61. A portion of the graph of a function defined on $[-3, 3]$ is shown. Complete the graph assuming that the function is

(a) even.

(b) odd.



62. **Depreciation** Smith Hauling purchased an 18-wheel truck for \$100,000. The truck depreciates at the constant rate of \$10,000 per year for 10 years.

(a) Write an expression that gives the value y after x years.

(b) When is the value of the truck \$55,000?

63. **Drug Absorption** A drug is administered intravenously for pain. The function

$$f(t) = 90 - 52 \ln(1+t), \quad 0 \leq t \leq 4$$

gives the number of units of the drug in the body after t hours.

(a) What was the initial number of units of the drug administered?

(b) How much is present after 2 hours?

(c) Draw the graph of f .

64. **Finding Time** If Joenita invests \$1500 in a retirement account that earns 8% compounded annually, how long will it take this single payment to grow to \$5000?

65. **Guppy Population** The number of guppies in Susan's aquarium doubles every day. There are four guppies initially.

(a) Write the number of guppies as a function of time t .

(b) How many guppies were present after 4 days? after 1 week?

(c) When will there be 2000 guppies?

(d) **Writing to Learn** Give reasons why this might not be a good model for the growth of Susan's guppy population.

66. **Doctoral Degrees** Table 1.22 shows the number of doctoral degrees earned in the given academic year by Hispanic students. Let $x = 0$ represent 1970–71, $x = 1$ represent 1971–72, and so forth.

Table 1.22 Doctorates Earned by Hispanic Americans

Year	Number of Degrees
1976–77	520
1980–81	460
1984–85	680
1988–89	630
1990–91	730
1991–92	810
1992–93	830

Source: U.S. Department of Education, as reported in the *Chronicle of Higher Education*, April 28, 1995.

(a) Find the linear regression equation for the data and superimpose its graph on a scatter plot of the data.

(b) Use the regression equation to predict the number of doctoral degrees that will be earned by Hispanic Americans in the academic year 2000–01.

(c) **Writing to Learn** Find the slope of the regression line. What does the slope represent?

67. **Estimating Population Growth** Use the data in Table 1.23

- about the population of New York State. Let $x = 60$ represent 1960, $x = 70$ represent 1970, and so forth.

Table 1.23 Population of New York State

Year	Population (millions)
1960	16.78
1980	17.56
1990	17.99

Source: *The Statesman's Yearbook*, 129th ed. (London: The Macmillan Press, Ltd., 1992).

(a) Find the exponential regression equation for the data.

(b) Use the regression equation to predict when the population will be 25 million.

(c) What annual rate of growth can we infer from the regression equation?