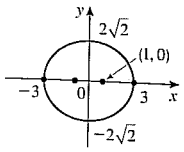
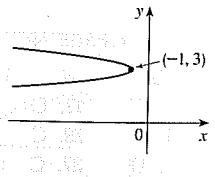
43. All curves have the vertical asymptote $x = 1$. For $c < -1$, the curve bulges to the right. At $c = -1$, the curve is the line $x = 1$. For $-1 < c < 0$, it bulges to the left. At $c = 0$ there is a cusp at $(0, 0)$. For $c > 0$, there is a loop.

45. $(\pm 1, 0), (\pm 3, 0)$



47. $\left(-\frac{25}{24}, 3\right), (-1, 3)$



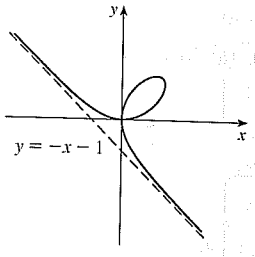
49. $\dfrac{x^2}{25} + \dfrac{y^2}{9} = 1$ **51.** $\dfrac{y^2}{72/5} - \dfrac{x^2}{8/5} = 1$

53. $\dfrac{x^2}{25} + \dfrac{(8y - 399)^2}{160{,}801} = 1$ **55.** $r = \dfrac{4}{3 + \cos\theta}$

57. (a) At $(0, 0)$ and $\left(\frac{3}{2}, \frac{3}{2}\right)$

(b) Horizontal tangents at $(0, 0)$ and $\left(\sqrt[3]{2}, \sqrt[3]{4}\right)$; vertical tangents at $(0, 0)$ and $\left(\sqrt[3]{4}, \sqrt[3]{2}\right)$

(d)



(g) $\frac{3}{2}$

PROBLEMS PLUS ■ PAGE 712

1. $\ln(\pi/2)$ **3.** $\left[-\frac{3}{4}\sqrt{3}, \frac{3}{4}\sqrt{3}\right] \times [-1, 2]$

CHAPTER 11

EXERCISES 11.1 ■ PAGE 724

Abbreviations: C, convergent; D, divergent

1. (a) A sequence is an ordered list of numbers. It can also be defined as a function whose domain is the set of positive integers.
(b) The terms a_n approach 8 as n becomes large.
(c) The terms a_n become large as n becomes large.

3. $1, \frac{4}{5}, \frac{3}{5}, \frac{8}{17}, \frac{5}{13}$ **5.** $\frac{1}{5}, -\frac{1}{25}, \frac{1}{125}, -\frac{1}{625}, \frac{1}{3125}$ **7.** $\frac{1}{2}, \frac{1}{6}, \frac{1}{24}, \frac{1}{120}, \frac{1}{720}$

9. 1, 2, 7, 32, 157 **11.** $2, \frac{2}{3}, \frac{2}{5}, \frac{2}{7}, \frac{2}{9}$ **13.** $a_n = 1/(2n - 1)$

15. $a_n = -3\left(-\frac{2}{3}\right)^{n-1}$ **17.** $a_n = (-1)^{n+1}\dfrac{n^2}{n + 1}$

19. 0.4286, 0.4615, 0.4737, 0.4800, 0.4839, 0.4865, 0.4884, 0.4898, 0.4909, 0.4918; yes; $\frac{1}{2}$

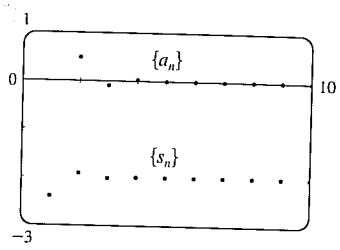
21. 0.5000, 1.2500, 0.8750, 1.0625, 0.9688, 1.0156, 0.9922, 1.0039, 0.9980, 1.0010; yes; 1

23. 1 **25.** 5 **27.** 1 **29.** 1 **31.** D **33.** 0
35. D **37.** 0 **39.** 0 **41.** 0 **43.** 0 **45.** 1
47. e^2 **49.** $\ln 2$ **51.** $\pi/2$ **53.** D **55.** D
57. 1 **59.** $\frac{1}{2}$ **61.** D **63.** 0
65. (a) 1060, 1123.60, 1191.02, 1262.48, 1338.23 (b) D
67. (a) $P_n = 1.08P_{n-1} - 300$ (b) 5734
69. $-1 < r < 1$
71. Convergent by the Monotonic Sequence Theorem; $5 \leq L < 8$
73. Decreasing; yes **75.** Not monotonic; no
77. Decreasing; yes
79. 2 **81.** $\frac{1}{2}(3 + \sqrt{5})$ **83.** (b) $\frac{1}{2}(1 + \sqrt{5})$
85. (a) 0 (b) 9, 11

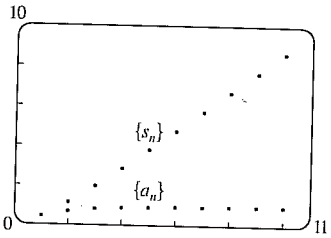
EXERCISES 11.2 ■ PAGE 735

1. (a) A sequence is an ordered list of numbers whereas a series is the *sum* of a list of numbers.
(b) A series is convergent if the sequence of partial sums is a convergent sequence. A series is divergent if it is not convergent.
3. 2
5. 1, 1.125, 1.1620, 1.1777, 1.1857, 1.1903, 1.1932, 1.1952; C
7. 0.5, 1.3284, 2.4265, 3.7598, 5.3049, 7.0443, 8.9644, 11.0540; D

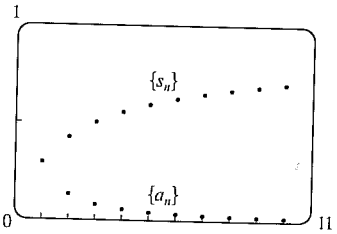
9. −2.40000, −1.92000, −2.01600, −1.99680, −2.00064, −1.99987, −2.00003, −1.99999, −2.00000, −2.00000; convergent, sum = −2



11. 0.44721, 1.15432, 1.98637, 2.88080, 3.80927, 4.75796, 5.71948, 6.68962, 7.66581, 8.64639; divergent



13. 0.29289, 0.42265, 0.50000, 0.55279, 0.59175, 0.62204, 0.64645, 0.66667, 0.68377, 0.69849; convergent, sum = 1



15. (a) C (b) D **17.** D **19.** $\frac{25}{3}$ **21.** 60 **23.** $\frac{1}{7}$
25. D **27.** D **29.** D **31.** $\frac{5}{2}$ **33.** D **35.** D
37. D **39.** D **41.** $e/(e - 1)$ **43.** $\frac{3}{2}$ **45.** $\frac{11}{6}$ **47.** $e - 1$
49. (b) 1 (c) 2 (d) All rational numbers with a terminating decimal representation, except 0.
51. $\frac{8}{9}$ **53.** $\frac{838}{333}$ **55.** 5063/3300
57. $-\dfrac{1}{5} < x < \dfrac{1}{5}; \dfrac{-5x}{1 + 5x}$ **59.** $-1 < x < 5; \dfrac{3}{5 - x}$
61. $x > 2$ or $x < -2; \dfrac{x}{x - 2}$ **63.** $x < 0; \dfrac{1}{1 - e^x}$
65. 1 **67.** $a_1 = 0, a_n = \dfrac{2}{n(n + 1)}$ for $n > 1$, sum = 1