53. 22   **54.** 19   **55.** 847   **56.** 975   **57.** $f(x) = -4x + 5$ **58.** $g(x) = 5x - 2$ **59.** $a_n = 3n - 2$ **60.** $a_n = 2n + 1$
61. a. $a_n = 0.77n + 9.23$ **b.** 30.0%   **62. a.** $a_n = 0.83n + 16.77$ **b.** 59.1%   **63.** Company A will pay $1400 more in year 10.
64. Company A will pay $600 more in year 10.   **65. a.** $21,153   **b.** $21,158; overestimates by $5   **66. a.** $83,245
b. $83,248; overestimates by $3   **68.** $442,500   **69.** Company A: $307,000; Company B: $324,000; Company B pays the greater total amount.
70. 1430 seats   **71.** 2869 seats   **78.** does not make sense   **79.** makes sense   **80.** makes sense   **81.** makes sense   **82.** the 200th term

83. 320 degree-days   **84.** $S_n = \dfrac{n}{2}(1 + 2n - 1) = \dfrac{n}{2}(2n) = n^2$ **85.** $-2; -2; -2; -2$; The ratio of a term to the term that directly precedes

it is always -2.   **86.** $5; 5; 5; 5$; The ratio of a term to the term that directly precedes it is always 5.   **87.** 8019
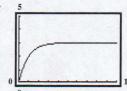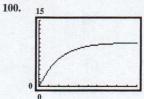
Section 11.3

Check Point Exercises

1. $12, 6, 3, \dfrac{3}{2}, \dfrac{3}{4}, \dfrac{3}{8}$ **2.** 3645   **3.** $a_n = 3(2)^{n-1}; a_8 = 384$ **4.** 9842   **5.** 19,680   **6.** $2,371,746   **7. a.** $333,946   **b.** $291,946
8. 9   **9.** 1   **10.** $4000

Exercise Set 11.3

1. $5, 15, 45, 135, 405$ **2.** $4, 12, 36, 108, 324$ **3.** $20, 10, 5, \dfrac{5}{2}, \dfrac{5}{4}$ **4.** $24, 8, \dfrac{8}{3}, \dfrac{8}{9}, \dfrac{8}{27}$ **5.** $10, -40, 160, -640, 2560$ **6.** $10, -30, 90, -270, 810$
7. $-6, 30, -150, 750, -3750$ **8.** $-2, 12, -72, 432, -2592$ **9.** $a_8 = 768$ **10.** $a_8 = 10,935$ **11.** $a_{12} = -10,240$ **12.** $a_{12} = -8192$
13. $a_{40} \approx -0.000000002$ **14.** $a_{30} \approx -0.000014901$ **15.** $a_8 = 0.1$ **16.** $a_8 = 0.004$ **17.** $a_n = 3(4)^{n-1}; a_7 = 12,288$
18. $a_n = 3(5)^{n-1}; a_7 = 46,875$ **19.** $a_n = 18\left(\dfrac{1}{3}\right)^{n-1}; a_7 = \dfrac{2}{81}$ **20.** $a_n = 12\left(\dfrac{1}{2}\right)^{n-1}; a_7 = \dfrac{3}{16}$ **21.** $a_n = 1.5(-2)^{n-1}; a_7 = 96$
22. $a_n = 5\left(-\dfrac{1}{5}\right)^{n-1}; a_7 = \dfrac{1}{3125}$ **23.** $a_n = 0.0004(-10)^{n-1}; a_7 = 400$ **24.** $a_n = 0.0007(-10)^{n-1}; a_7 = 700$ **25.** 531,440   **26.** 12,285
27. 2049   **28.** 177,148   **29.** $\dfrac{16,383}{2}$ **30.** $\dfrac{5461}{24}$ **31.** 9840   **32.** 5460   **33.** 10,230   **34.** -6564 **35.** $\dfrac{63}{128}$ **36.** $\dfrac{364}{2187}$
37. $\dfrac{3}{2}$ **38.** $\dfrac{4}{3}$ **39.** 4   **40.** 6   **41.** $\dfrac{2}{3}$ **42.** $\dfrac{9}{4}$ **43.** $\dfrac{80}{13} \approx 6.15385$ **44.** $\dfrac{120}{17} \approx 7.05882$ **45.** $\dfrac{5}{9}$ **46.** $\dfrac{1}{9}$ **47.** $\dfrac{47}{99}$ **48.** $\dfrac{83}{99}$
49. $\dfrac{257}{999}$ **50.** $\dfrac{529}{999}$ **51.** arithmetic, $d = 1$ **52.** arithmetic, $d = 1$ **53.** geometric, $r = 2$ **54.** geometric, $r = \dfrac{1}{2}$ **55.** neither
56. neither   **57.** 2435   **58.** -5260 **59.** 2280   **60.** -2700 **61.** -140 **62.** 1140   **63.** $a_2 = 12, a_3 = 18$
64. $a_2 = -6, a_3 = 18$ **65.** $16,384   **66.** $536,870,912   **67.** $3,795,957   **68.** $38,2811.45   **69. a.** approximately 1.01 for each division
b. $a_n = 35.48(1.01)^{n-1}$ **c.** approximately 38.04 million   **70. a.** approximately 1.02 for each division   **b.** $a_n = 22.12(1.02)^{n-1}$
c. approximately 25.41 million   **71.** $32,767   **72.** $1,073,741,823   **73.** $793,583   **74.** Company B; $780   **75.** 130.26 in.   **76.** 134.07 in.
77. a. $11,617   **b.** $1617   **78. a.** $14,163   **b.** $1663   **79. a.** $87,052   **b.** $63,052   **80. a.** $171,271   **b.** $135,271
81. a. $693,031   **b.** $293,031   **82. a.** $956,793   **b.** $356,793   **83.** $30,000   **84.** $98,888   **85.** $9 million   **86.** $15 billion   **87.** $\dfrac{1}{3}$

99.

100.

horizontal asymptote: $y = 3$; sum of series: 3   horizontal asymptote: $y = 10$; sum of series: 10
101. makes sense   **102.** makes sense   **103.** makes sense   **104.** does not make sense   **105.** false   **106.** false   **107.** false   **108.** true
109. Release 2000 flies each day.   **110.** $442   **112.** $6 = 6$ **113.** $15 = 15$ **114.** $\dfrac{(k + 1)(k + 2)(2k + 3)}{6}$

Mid-Chapter 11 Check Point

1. $1, -2, \dfrac{3}{2}, -\dfrac{2}{3}, \dfrac{5}{24}$ **2.** $5, 2, -1, -4, -7$ **3.** $5, -15, 45, -135, 405$ **4.** $3, 1, 3, 1, 3$ **5.** $a_n = 4n - 2; a_{20} = 78$
6. $a_n = 3(2)^{n-1}; a_{10} = 1536$ **7.** $a_n = -\dfrac{1}{2}n + 2; a_{30} = -13$ **8.** 5115   **9.** 2350   **10.** 6820   **11.** $-29,300$ **12.** 44   **13.** 3725
14. $\dfrac{1995}{64}$ **15.** $\dfrac{5}{7}$ **16.** $\dfrac{5}{11}$ **17.** Answers will vary. An example is $\displaystyle\sum_{i=1}^{18} \dfrac{i}{i + 2}$.   **18.** 464 ft; 3600 ft   **19.** $311,249

Section 11.4

Check Point Exercises

1. a. $S_1: 2 = 1(1 + 1); S_k: 2 + 4 + 6 + \cdots + 2k = k(k + 1); S_{k+1}: 2 + 4 + 6 + \cdots + 2(k + 1) = (k + 1)(k + 2)$
   b. $S_1: 1^3 = \dfrac{1^2(1 + 1)^2}{4}; S_k: 1^3 + 2^3 + 3^3 + \cdots + k^3 = \dfrac{k^2(k + 1)^2}{4}; S_{k+1}: 1^3 + 2^3 + 3^3 + \cdots + (k + 1)^3 = \dfrac{(k + 1)^2(k + 2)^2}{4}$

2. $S_1: 2 = 1(1 + 1); S_k: 2 + 4 + 6 + \cdots + 2k = k(k + 1); S_{k+1}: 2 + 4 + 6 + \cdots + 2k + 2(k + 1) = (k + 1)(k + 2); S_{k+1}$ can be obtained by
   adding $2k + 2$ to both sides of S_k.