Practise, Apply, Solve 2.3, page 123

1. **(a)** geometric, $r = \frac{1}{2}$ **(b)** geometric, $r = \frac{4}{5}$
(c) neither **(d)** geometric, $r = -\frac{3}{2}$
(e) geometric, $r = -\frac{1}{2}$
(f) neither

2. **(a)** $t_n = 2(3)^{n-1}$, $S_n = 2(3^n - 1)$, $S_8 = 13\,120$
(b) $t_n = \left(-\frac{2}{3}\right)^{n-1}$, $S_n = -\frac{3}{5}\left[\left(-\frac{2}{3}\right)^n - 1\right]$, $S_8 = 0.58$
(c) $t_n = 6(-2)^{n-1}$, $S_n = 2[1 - (-2)^n]$, $S_8 = -510$
(d) $t_n = 81\left(\frac{1}{3}\right)^{n-1}$, $S_n = \frac{243}{2}\left[1 - \left(\frac{1}{3}\right)^n\right]$, $S_8 = 121.48$
(e) $t_n = 0.4(0.1)^{n-1}$, $S_n = \frac{4}{9}[1 - (0.1)^n]$, $S_8 = 0.44$
(f) $t_n = 8(-1)^{n-1}$, $S_n = 4[1 - (-1)^n]$, $S_8 = 0$

3. **(a)** $S_7 = -107.5$ **(b)** $S_{10} = 81.00$
(c) $S_8 = 4.805 \times 10^{10}$ **(d)** $S_9 = 104.43$
(e) $S_n = \frac{1 - x^n}{1 - x}$ **(f)** $S_n = \frac{5w[1 - (2w)^n]}{1 - 2w}$

4. **(a)** $-13\,122$ **(b)** -9840

5. **(a)** 7161 **(b)** -1533 **(c)** 406.234
(d) 64 125 **(e)** 18 882.137 67

6. 49 205

7. 8 rounds

8. Since his pay increases by 10% each month, his salary each month is 1.10 times the previous month. His monthly salary can be represented by the geometric sequence $t_n = 1200(1.10)^{n-1}$ for the nth month. To calculate his total pay for the last 6 months of his first year, we can: **1.** Find the geometric sum from $n = 1$ to $n = 12$ and then subtract the geometric sum from $n = 1$ to $n = 6$; or **2.** Find the geometric sum from $n = 7$ to $n = 12$.

9. **(a)** Original e-mail leads to 5 people, each of these leads to 5 people. (1, 5, 25)
(b) first e-mailing: 5; second e-mailing: 25; third e-mailing:125
(c) $S_n = \frac{a(r^n - 1)}{r - 1} = \frac{5(5^n - 1)}{5 - 1}$
(d) 488 280; This is unlikely since not all receivers of the e-mailing would forward it to 5 people. Also, it is likely that several people would receive the e-mailing more than once since many receivers will forward it to some of their common friends or relatives.

10. 794.7

11. **(a)** \$21 960.17 **(b)** \$213 519.56

12. **(a)** \$566 699.89 **(b)** \$4 974 410.97

13. 68.20 m

14. **(a)** \$7080.84 **(b)** \$45 400.55

16. **(a)** 12 tickets **(b)** \$14 200

18. **(a)** $t_2 = 3r$ $t_3 = 3r^2$
(b) -3 or 2; If $r = -3$ then $t_1 = 3$, $t_2 = -9$, $t_3 = 27$, and $S_3 = 21$; If $r = 2$ then $t_1 = 3$, $t_2 = 6$, $t_3 = 12$, and $S_3 = 21$.

20. **(a)** -50 **(b)** 3267

21. **(a)** 1 **(b)** no
(c) if the series converges; i.e. $-1 < r < 1$