Section 1.5 Extra Practice

1. State whether each geometric series is convergent or divergent.

a) $80 + 20 + 5 + \dfrac{5}{4} + \ldots$

b) $-30 + 20 - \dfrac{40}{3} + \dfrac{80}{9} - \ldots$

c) $t_1 = -5, \ r = \dfrac{1}{2}$

d) $t_1 = \dfrac{1}{3}, \ r = -2$

2. Determine the sum of each geometric series, if it exists.

a) $t_1 = -4, \ r = \dfrac{4}{5}$

b) $t_1 = 10, \ r = \dfrac{-2}{3}$

c) $10 + 10\sqrt{3} + 30 + 30\sqrt{3} + \ldots$

d) $\dfrac{5}{3} - \dfrac{5}{9} + \dfrac{5}{27} - \dfrac{5}{81} + \ldots$

e) $8 + 8\left(\dfrac{2}{3}\right) + 8\left(\dfrac{2}{3}\right)^2 + 8\left(\dfrac{2}{3}\right)^3 + \ldots$

f) $-2 - 2\left(\dfrac{-3}{4}\right) - 2\left(\dfrac{-3}{4}\right)^2 - 2\left(\dfrac{-3}{4}\right)^3 - \ldots$

3. Express each of the following as an infinite geometric series. Determine the sum of the series.

a) $0.\overline{63}$

b) $7.4\overline{5}$

c) $0.123\,\overline{456}$

4. The general term of an infinite geometric series is $t_n = 7\left(\dfrac{1}{3}\right)^{n-1}$. Determine the sum of the series, if it exists.

5. The sum of an infinite geometric series is $\dfrac{10}{3}$ and the first term is 5. Determine the common ratio.

6. The sum of an infinite geometric series is $\dfrac{3\pi}{2}$ and the common ratio is $\dfrac{1}{2}$. Determine the first term.

7. A ball is dropped from a height of 2.0 m onto a floor. On each bounce the ball rises to 75% of the height from which it fell. Calculate the total distance the ball travels before coming to rest.

8. Determine the values of x such that the series $1 + x + x^2 + x^3 + \ldots$ has a sum.

9. The sum of an infinite geometric series is three times the first term. Determine the common ratio.

10. A new oil well produces 12 000 m³/month of oil. Its production is known to be dropping by 2.5% each month.

a) What is the total production in the first year?

b) Determine the total production of the well.