

# Sequences And Series

Name: \_\_\_\_\_

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

a)  $80 + 20 + 5 + \frac{5}{4} + \dots$

*convergent*

b)  $-30 + 20 - \frac{40}{3} + \frac{80}{9} - \dots$

*convergent*

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

*convergent*

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

*divergent*

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

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

*-20*

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

*does not exist*

e)  $8 + 8\left(\frac{2}{3}\right) + 8\left(\frac{2}{3}\right)^2 + 8\left(\frac{2}{3}\right)^3 + \dots$

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

*6*

d)  $\frac{5}{3} - \frac{5}{9} + \frac{5}{27} - \frac{5}{81} + \dots$

*$\frac{5}{4}$*

f)  $-2 - 2\left(\frac{-3}{4}\right) - 2\left(\frac{-3}{4}\right)^2 - 2\left(\frac{-3}{4}\right)^3 - \dots$

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

a)  $0.\overline{63}$

b)  $7.\overline{45}$

c)  $0.123\overline{456}$

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

$$\frac{21}{2}$$

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

$$-\frac{1}{2}$$

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

$$\frac{3\pi}{4}$$

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.

$$14$$

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

$$|x| < 1$$

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

$$\frac{2}{3}$$

10. A new oil well produces 12 000 m<sup>3</sup>/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?

$$125\,761\text{ m}^3$$

b) Determine the total production of the well.

$$480\,000\text{ m}^3$$