Name:_____   Date:_____

Pre-Calculus 11: HW 1.5 Infinite Geometric Series $S_\infty = \dfrac{a}{1-r}, \quad |r| < 1$

1. What does it mean when a geometric series is divergent? What does it mean when it is convergent?

2. How can you tell whether if a geometric series is divergent or convergent?

3. Given each geometric series, find the value of the common ratio, then indicate whether if it is convergent or divergent? If it is convergent, find the sum of the series:

a) $2+4+8+16+......$	b) $16+8+4+2+1+0.5+.....$
c) $54+18+6+2+........$	d) $\dfrac{24}{25}+\dfrac{6}{5}+\dfrac{3}{2}+\dfrac{15}{8}+.....$
e) $\dfrac{9}{8}+\dfrac{3}{4}+\dfrac{1}{2}+\dfrac{1}{3}+\dfrac{2}{9}+.....$	f) $6+(-6)+6+(-6)+6+(-6)+6+(-6)+.....$

4. Find the sum of each infinite geometric series:

a) $S = 27+9+3+1+.......$	b) $S = 2+1.8+1.62+1.458+.......$

c) $S = 0.3 + \dfrac{3}{100} + \dfrac{3}{1000} + \dfrac{3}{10000} + \ldots\ldots$	d) $S = 32 + 16 + 8 + 4 + 2 + \ldots\ldots$
e) $10 + 5 + 2.5 + 1.25 + 0.625 + \ldots$	f) $24 - 12 + 6 - 3 + 1.5 - \ldots$
g) $3 + 3\left(\dfrac{2}{3}\right) + 3\left(\dfrac{2}{3}\right)^2 + 3\left(\dfrac{2}{3}\right)^3 + 3\left(\dfrac{2}{3}\right)^4 + \ldots$	h) $4 + 4\left(\dfrac{-4}{5}\right) + 4\left(\dfrac{-4}{5}\right)^2 + 4\left(\dfrac{-4}{5}\right)^3 + 4\left(\dfrac{-4}{5}\right)^4 + \ldots$

5. If the sum of an infinite geometric series is 10 and the first term is 3, then what is the common ratio? What are the values of the first three terms?

6. If the common ratio is 2/5 and the sum is 20, then what is the first value of the infinite geometric sequence? What are the values of the first three terms?

7. A ball is dropped from a height of 5.0meters to a floor. After each bounce, the ball rises to 40% of its previous height. Calculate the total vertical distance the ball travels before it comes to rest.

8. The sum of an infinite geometric series is 1 and the common ratio is $-\dfrac{2}{5}$, determine the 3rd term.

9. Determine the 8th term of an infinite geometric series with $S_\infty = 24$ and $r = \dfrac{3}{4}$

10. An oil well produces 30,000 barrels of oil during its first month of production. Suppose its production drops by 5% each month. Estimate the total production before the well runs dry.

11. For what values of "x" will the series have a finite sum? $1+\left(\dfrac{x}{3}\right)+\left(\dfrac{x}{3}\right)^2+\left(\dfrac{x}{3}\right)^3+....$

12. For what values of "x" will the series have a finite sum? $1+2x+4x^2+8x^3+....$