Calculus Section 9.2 Geometric Series
-Use properties of infinite geometric series

Homework: page 601 #’s 7, 8, 15, 16, 25, 26, 29, 30, 33, 91-94

**Geometric Series**Series of the form are called **geometric series** with ratio r.
If 0 < |r| < 1, then the geometric series converges. If |r| ≥ 1, then the series diverges.

**Example) Determine convergence or divergence of the series.**
1) 2) 3)

$$\sum\_{n=0}^{\infty }\left(\frac{3}{2}\right)^{n}$$

$$\sum\_{n=0}^{\infty }\frac{2-3^{n}}{5^{n}}$$

$$\sum\_{n=0}^{\infty }\frac{3}{2^{n}}$$

$$\sum\_{n=0}^{\infty }\left(1+\frac{k}{n}\right)^{n}$$

$$\sum\_{n=0}^{\infty }\left(\frac{e}{π}\right)^{-n}$$

4) 5)

The Geometric Series is one of the few series where we actually find the sum instead of just saying it converges or diverges.

$$\sum\_{n=0}^{\infty }ar^{n}$$

$$S=\frac{a}{1-r}$$

The sum of a Geometric series is given by , provided the series converges.

 Notice that this summation starts at n = 0. Starting values other than n = 0 will impact how we evaluate the sum.

**Example) Find the sum of the following geometric series.**

$$\sum\_{n=0}^{\infty }\frac{3}{2^{n}}$$

$$\sum\_{n=0}^{\infty }\frac{2-3^{n}}{5^{n}}$$

1) 2)

$$\sum\_{n=2}^{\infty }\frac{-3}{4^{n}}$$

$$\sum\_{n=1}^{\infty }\left(\frac{-1}{3}\right)^{n}$$

3) 4)