Geometric Series

Example: Converges to when

a = r = both a and r are constants

A series can be part of a function.

Example: n is the counter that creates each term of the series

When will converge?

Interval of Convergence: the interval of the domain values, x, for which the resulting series will converge

Center of Convergence: midpoint of interval of convergence

Radius of Convergence: distance from the center of convergence to the endpoints of the interval of convergence

Interval of convergence: (-1, 1) Center of Convergence: x = 0 Radius of convergence: R = 1

Geometric Series are a subset of Power Series.

a and r are constants

a is a constant, r is a variable

**Power Series** – coefficients do not have to be constant

General form usually starts with n = 0

centered at 0

centered at a

For each power series find Cn and the center of convergence

In a geometric series, you use the condition that in order to converge, .

For a general power series, you must use the ratio test (or occasionally the root test).

Once you find the interval of convergence, **you must check the endpoints** because the ratio test is inconclusive if the limit equals 1 or -1.

There are 3 possible outcomes.

1. The series converges over some finite interval, centered at a, , R is the radius of convergence. (Diverges for )

2. The series converges only at the center point, x = a. (Diverges everywhere else) R = 0.

3. Converges for all real numbers. .

Case 1:

Case 2:

Case 3: (Bessel Function)

Try: