

## Lesson 10.5: Elementary Series & Alternating Series

In this lesson, you will be using the four elementary power series. You are expected to know them from memory.

$$\sin(x) =$$

$$\cos(x) =$$

$$e^x =$$

$$\ln(x) =$$

### Creating New Power Series

**Examples:** Using these elementary series, find a power series for each of the following functions. Show four terms and the general term.

1.  $\sin(x^2) =$

2.  $\cos(\sqrt{x}) =$

3.  $xe^x =$

4.  $\frac{1}{x} =$

5.  $\int_1^t \ln(x) dx =$

## Alternating Series

An Alternating Series is a series whose terms \_\_\_\_\_ between positive and negative. Three of the four elementary series are alternating series.

### Alternating Series Test for Convergence

**Examples:** Determine the convergence or divergence.

1.  $\sum_{n=1}^{\infty} (-1)^{n+1} \left(\frac{1}{n}\right)$

2.  $\sum_{n=1}^{\infty} (-1)^{n+1} \left(\frac{n+1}{n}\right)$

**Summary of Three Tests for Convergence:**