**<u>(Fill in each blank) Commonly used Maclaurin Series</u>, see Table 1 page 768.**

- $\frac{1}{1-x}=\sum_{n=0}^{\infty}x^n$ for $-1<x<1$.

- $\frac{1}{1+x}=$ ______________________________ for ____________________.

- $\ln(1-x)=-\sum_{n=1}^{\infty}\frac{x^n}{n}$ for $-1\le x<1$.

  - $\sum_{n=1}^{\infty}\frac{1}{n\,2^n}=$ __________.

- $\ln(1+x)=$ ______________________________ for ____________________.

- $\tan^{-1}x=\sum_{n=0}^{\infty}\frac{(-1)^n x^{2n+1}}{2n+1}$ for $-1\le x\le 1$.

  - $\sum_{n=0}^{\infty}\frac{(-1)^n}{2n+1}=$ __________.

- $e^x=\sum_{n=0}^{\infty}\frac{x^n}{n!}$ for $-\infty<x<\infty$.

  - $\sum_{n=0}^{\infty}\frac{1}{n!}=$ __________.

- $\sin x=\sum_{n=0}^{\infty}\frac{(-1)^n x^{2n+1}}{(2n+1)!}$ for $-\infty<x<\infty$.

  - $\sum_{n=0}^{\infty}\frac{(-1)^n \pi^{2n+1}}{(2n+1)!}=$ __________.

- $\cos x=$ ______________________________ for ____________________.

**<u>Recall (fill in the blank, see middle of pg 761)</u>**

The $n$-th Taylor Polynomial centered at $a$ is

______________________________________________________________________.

**<u>Remainder in a Taylor Polynomial</u>**

Taylor polynomials provide good approximations to functions near a specific point, but how good are the approximations?

Let $R_n(x) = f(x) - T_n(x)$, then $R_n(x)$ is called the remainder of the Taylor series.

**(Copy from pg 762) Theorem Taylor's Inequality**

Suppose there exists a number $M$ such that

$$\left|f^{(n+1)}(x)\right| \le M \text{ for } |x-a| \le d,$$

then the remainder $R_n(x)$ of the Taylor series satisfies

$|R_n(x)| \le$ ________________________ for ________________________.

<u>Copy Sec 11.11 (next section) Example 1 pg 775-776</u>: Consider the function $f(x) = \sqrt[3]{x}$.

a. Find the **<u>Taylor polynomials of order 2</u>** centered at $x = 8$ for $f(x)$.

b. How accurate is this approximation when $7 \le x \le 9$?