<u>(Fill in each blank) Commonly used Maclaurin Series</u>

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

Recall (fill in the blank, see middle of pg 761)

The n-th Taylor Polynomial centered at a is

____.

Remainder in a Taylor Polynomial

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 ________________________.

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

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

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