11.10: Additional Problems

1. Find the Maclaurin series for e^{-x^2} and $\sin(3x)$.

2. Find the Maclaurin series for $e^x \sin x$ using multiplication of series.

3. Find the Maclaurin series for $\tan x = \dfrac{\sin x}{\cos x}$ using long division.

Binomial Series

Important Series

For ANY real number k, we have the following:

$$(1+x)^k = \sum_{n=0}^{\infty} \binom{k}{n} x^n \qquad R = 1$$

Here, $\binom{k}{n} = \dfrac{k(k-1)(k-2)\dots(k-n+1)}{n!}$

1. Write $\sqrt[3]{8+x}$ as a power series. What is the radius of convergence?

Further Problems: # 31, 33, 34, 67, 68, 69, 70

10.1: Parametric Equations

Today, we will start Parametric Equations but we will explore it more on Thursday.

For each of the following, (1) Sketch the curve and (2) rewrite the equation, eliminating the parameter.

1. $x = 2t - 1$ and $y = \frac{1}{2}$.

2. $x = -3t + 2, y = 2t + 3$

3. $x = t^2 - 3, y = t + 2, -3 \leq t \leq 3$

4. $x = \sin t, y = 1 - \cos t, 0 \leq t \leq 2\pi$

Further Problems: # 9, 11, 12, 14, 18

Review

11.4: The Comparison Tests

Recall: The Comparison Test tells us that if we have a positive series and it is bigger than a series which diverges, then our series must also diverge. This makes intuitive sense since if something adds up to infinity and we have something bigger than that it must also add up to infinity.

On the other hand, if we have a positive series and it smaller than a series which a converges, then it must also converge. The intuition here is that if a sum converges to a number, our smaller thing can't sum to infinity since that's bigger than any number!

Examples:

1. Determine whether $\sum_{n=0}^{\infty} \frac{1}{x^3 + 8}$ converges or diverges.

2. Determine whether $\sum_{n=1}^{\infty} \frac{6^n}{5^n - 1}$ converges or diverges.

3. Determine whether $\sum_{n=1}^{\infty} \frac{1 + \cos n}{e^n}$ converges or diverges.

4. Determine whether $\sum_{n=1}^{\infty} \frac{\ln n}{n}$ converges or diverges.

Further Problems: # 4, 5, 6, 7, 10, 11, 12, 16