MATH 5B - Single Variable Calculus II — Spring 2019

§11.10 Taylor and Maclaurin Series

In-class Activity 11.10

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Activity 1:

(a) Find a formula for the nth derivative of $f(x)$, $f^{(n)}(x) = \frac{d^n f}{dx^n}$.

(b) Find a formula for $f^{(n)}(a)$, for $n = 0, 1, 2, 3, 4$ and general n.

(c) Find a formula for c_n in terms of $f^{(n)}(a)$.

Activity 2:

Prove Theorem 2: That is, find the Taylor series for e^x at $x = 0$ and it's interval of convergence.

Activity 3:

Prove Theorem 3: That is, find the Taylor series for $\sin(x)$ at $x = 0$ and it's interval of convergence.

Activity 4:

Prove Theorem 4: That is, find the Taylor series for $\cos(x)$ at $x = 0$ and it's interval of convergence.

Activity 5:

Find the Taylor series for $f(x) = x^4 e^{-3x^2}$ at $x = 0$ and the radius of convergence.

Activity 6:

Find the Taylor series for $f(x) = \sqrt{x}\sin(x^2)$ at $x = 0$ and the radius of convergence.

Activity 7:

Find the Taylor series for $f(x) = e^x$ at $x = -1$ and the radius of convergence.

Activity 8:

Find the Taylor series for $f(x) = \ln(x)$ at $x = 2$ and the radius of convergence.

Activity 9:

Evaluate:

$$\lim_{x \to 0} \frac{\cos(x^5) - 1}{x^{10}}$$

Note: use power series. You can use L'Hôpital's Rule, but it is a very long calculation.