

Name: _____

Notesheet. Section 11.5 Part 2: Power Series and Taylor Series

Math 1220

Definition 1. The Taylor series of $f(x)$ at $x = a$ is a power series

Challenge 2. Find the Taylor series of

(a) $f(x) = \frac{1}{x-1}$ at $x = 2$

(b) $f(x) = \ln(1+x)$ at $x = 0$

Definition 3. The Maclaurin series of $f(x)$ is

Challenge 4. Find the Maclaurin series of $f(x) = xe^x$.

Challenge 5. The following are common Maclaurin series which you should know. Convince yourself of them at home!

$$(a) e^x = \sum_{n=0}^{\infty}$$

$$(b) \ln(1+x) = \sum_{n=1}^{\infty}$$

$$(c) \sin(x) = \sum_{n=0}^{\infty}$$

$$(d) \cos(x) = \sum_{n=0}^{\infty}$$

$$(e) \frac{1}{1-x} = \sum_{n=0}^{\infty}$$

Theorem 6. If $\sum_{n=0}^{\infty} a_n(x-a)^n$ represents $f(x)$ at $x=a$, then

$$\frac{d}{dx} \sum_{n=0}^{\infty} a_n(x-a)^n =$$

Theorem 7. If $\sum_{n=0}^{\infty} a_n(x-a)^n$ represents $f(x)$ at $x=a$, then $a_n =$