# MA166: Recitation 11

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# 1 Homework

## 1.1 This Week's Summary

Here's a summary of the material that was (presumably) covered this week. From Stewart, we have

## 1.2 WebAssign Homework

Solutions to selected problems

### Homework 28

**Problem 1** (WebAssign HW 28, # 1)**.** Find a power series representation for the function.

$$f(x) = \frac{1}{9+x}.$$

Determine the interval of convergence.

**Problem 2** (WebAssign HW 28, # 2)**.** Find a power series representation for the function.

$$f(x) = \frac{8}{9-x}.$$

Determine the interval of convergence.

**Problem 3** (WebAssign HW 28, # 3)**.** Find a power series representation for the function.

$$f(x) = \frac{x}{4+x^2}.$$

Determine the interval of convergence.

**Problem 4** (WebAssign HW 28, # 4)**.** Find a power series representation for the function.

$$f(x) = \frac{10}{x^2-2x-24}.$$

Determine the interval of convergence.

**Problem 5** (WebAssign HW 28, # 5)**.** Find a power series representation for the function.

$$f(x) = \frac{1}{(7+x)^2}.$$

Determine the interval of convergence.

**Problem 6** (WebAssign HW 28, # 6)**.** Find a power series representation for the function.

$$f(x) = \ln(3-x).$$

Determine the interval of convergence.

**Problem 7** (WebAssign HW 28, # 7)**.** Evaluate the indefinite integral as a power series.

$$\int \frac{t}{1-t^{11}}dt.$$

What is the radius of convergence $R$?

**Problem 8** (WebAssign HW 28, # 8)**.** Use a power series to approximate the definite integral, $I$, to six decimal places.

$$\int_0^{0.1} \frac{1}{1+x^6}dx.$$

## Homework 29

**Problem 9** (WebAssign HW 29, # 1)**.** Find the MacLaurin series for $f(x)$ using the definition of a MacLaurin series. [Assume that $f$ has a power series expansion. Do not show that $R_n(x) \to 0$.]

$$f(x) = \sin\Big(\frac{\pi x}{3}\Big).$$

Find the associated radius of convergence $R$.

**Problem 10** (WebAssign HW 29, # 2)**.** Find the MacLaurin series for $f(x)$ using the definition of a MacLaurin series. [Assume that $f$ has a power series expansion. Do not show that $R_n(x) \to 0$.]

$$f(x) = e^{-5x}.$$

Find the associated radius of convergence $R$.

**Problem 11** (WebAssign HW 29, # 3)**.** Find the Taylor series for $f(x)$ centered at the given value of $a$. [Assume that $f$ has a power series expansion. Do not show that $R_n(x) \to 0$.]

$$f(x) = x^4 - 4x^2 + 2, \qquad a = 2.$$

Find the associated radius of convergence $R$.

**Problem 12** (WebAssign HW 29, # 4)**.** Find the Taylor series for $f(x)$ centered at the given value of $a$. [Assume that $f$ has a power series expansion. Do not show that $R_n(x) \to 0$.]

$$f(x) = \ln x, \qquad a = 6.$$

Find the associated radius of convergence $R$.

**Problem 13** (WebAssign HW 29, # 5)**.** Find the Taylor series for $f(x)$ centered at the given value of $a$. [Assume that $f$ has a power series expansion. Do not show that $R_n(x) \to 0$.]

$$f(x) = \frac{10}{x}, \qquad a = -2.$$

Find the associated radius of convergence $R$.

## Homework 30

**Problem 14** (WebAssign HW 30, # 1)**.** Use the MacLaurin series in the table (it's somewhere in the book, I'll put a link here ) to obtain the MacLaurin series for the given function.

$$f(x) = 6e^x + e^{4x}.$$

**Problem 15** (WebAssign HW 30, # 2)**.** Use the MacLaurin series in the table to obtain the MacLaurin series for the given function.

$$f(x) = 4x \cos\left(\frac{x^2}{9}\right).$$

**Problem 16** (WebAssign HW 30, # 3)**.** Use the MacLaurin series in the table to obtain the MacLaurin series for the given function.

$$f(x) = 9 \sin^2 x.$$

[*Hint*: Use $\sin^2 x = (1 - \cos 2x)/2$.]

**Problem 17** (WebAssign HW 30, # 4)**.** Use series to approximate the definite integral $I$ to within the indicated accuracy.

$$I = \int_0^{0.5} x^4 e^{-x^2} dx$$

($|\text{error}| < 0.001$).

**Problem 18** (WebAssign HW 30, # 5)**.** Use series to evaluate the limit.

$$\lim_{x \to 0} \frac{1 - \cos 3x}{1 + 3x - e^{3x}}.$$

**Problem 19** (WebAssign HW 30, # 6)**.** Use multiplication or division of power series to find the first three nonzero terms in the MacLaurin series for the function.

$$y = e^{-x^2} \cos x.$$

## 2 Exam III Problems