# Math 102, Fall 2022 — Homework 9

## Tim Chumley

### Due December 2 at 5:00 pm

**Instructions.** This problem set has material from Week 11 and Week 12 of class.

**Problem 1.** Find the interval of convergence and radius of convergence for the following power series.

a. $\sum_{n=1}^{\infty} \frac{(-1)^n (x-3)^n}{n}$

b. $\sum_{n=1}^{\infty} \frac{(-1)^n (x-5)^n}{2^n n^2}$

c. $\sum_{n=0}^{\infty} \frac{(x+4)^n}{n!}$

d. $\sum_{n=1}^{\infty} \frac{n}{3^n} x^n$

e. $\sum_{n=0}^{\infty} n! \left(\frac{x}{10}\right)^n$

**Problem 2.** Find the Taylor polynomial of degree $n$ centered at $x = c$ for the given function $f$.

a. $f(x) = xe^x, n = 5, c = 0$

b. $f(x) = e^{2x}, n = 5, c = 0$

c. $f(x) = \ln(x + 1), n = 4, c = 1$

d. $f(x) = 1/x^2, n = 8, c = 1$

e. $f(x) = x^3 + 7x^2 - 5x + 1, n = 3, c = 0$ (what do you think is true about Maclaurin polynomials of degree $n$ when $f$ is a polynomial of degree $n$?)