

### Practice Exam 3

*No calculators. Show your work. Clearly mark each answer.*

1. Find the radii and the intervals of convergence of the following power series.

(a)

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

(b)

$$\sum_{n=0}^{\infty} \frac{x^{2n}}{4^n}$$

(c)

$$\sum_{n=0}^{\infty} \frac{n^2(x+2)^n}{2^n}$$

2. Using Maclaurin series, compute the following limits.

(a)

$$\lim_{x \rightarrow 0} \frac{e^{2x} - 1 - 2x}{x^2}$$

(b)

$$\lim_{x \rightarrow 0} \frac{\sin x - x + \frac{x^3}{6}}{x^5}$$

3. Find the quadratic ( $n = 2$ ) Taylor polynomial at  $a = 1$  of the following function

$$x^{3/2}.$$

4. What is the largest  $d$  can be such that the approximation

$$\cos x \approx 1 - x^2/2$$

is accurate to 4 decimal places for  $|x| \leq d$ ?

5. Find the Maclaurin series of the following functions and find the radii of convergence.

(a)

$$\sin(x^2/4)$$

(b)

$$\ln(1 - 4x)$$

6. Find the Taylor series of the following functions at  $a = 1$

(a)

$$\frac{1}{x}$$

(b)

$$xe^{2x}$$