

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 an equation of the tangent line to the curve $x = t^4 + 1$, $y = t^2 - 1$ at $t = 1$. Compute $\frac{d^2y}{dx^2}$ at $t = 1$?
6. Find the points on the curve $x = t^3 - 3t$, $y = t^2 - 2$ where the tangent is horizontal or vertical.