
On the front of your bluebook, please write your name, lecture number, and instructor name. This exam is worth 100 points and has 6 questions on both sides of this paper.

- Make sure all of your work is in your bluebook. Nothing on this exam sheet will be graded. Please begin each problem on a new page.
- **Show all work and simplify your answers.** Name any theorem you use. Answers with no justification will receive no points unless the problem explicitly states otherwise.

5. (8 pts) Find the function $g(x)$ which has the power series representation

$$\sum_{n=1}^{\infty} (-1)^n \binom{1/3}{n} 9^n x^{n+1} \quad \text{for } |x| < \frac{1}{9}.$$

6. (12 pts) Consider the parametric curve $x = 2 + \sqrt{t}$, $y = |t - 1|$, $0 \le t \le 4$.

   (a) Sketch the curve. Label the coordinates of the initial and terminal points. Indicate the direction of motion as the parameter increases.

   (b) Find a Cartesian representation of the curve.

Taylor Series

$$\sum_{n=0}^{\infty} \frac{f^{(n)}(a)}{n!}(x-a)^n$$

Taylor's Formula

$$R_n(x) = \frac{f^{(n+1)}(z)}{(n+1)!}(x-a)^{n+1}$$

Frequently Used Maclaurin Series

$$\frac{1}{1-x} = \sum_{n=0}^{\infty} x^n \qquad R = 1$$

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} \qquad R = \infty$$

$$\sin x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!} \qquad R = \infty$$

$$\cos x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!} \qquad R = \infty$$

$$\tan^{-1} x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{2n+1} \qquad R = 1$$

$$\ln(1+x) = \sum_{n=1}^{\infty} (-1)^{n-1} \frac{x^n}{n} \qquad R = 1$$

$$(1+x)^k = \sum_{n=0}^{\infty} \binom{k}{n} x^n \qquad R = 1$$