

Department of Mathematics, College of Sciences
King Saud University, Riyadh.

M-203 (Differential and Integral Calculus)

1st MidTerm Exam. (1st sem. 1447) (2025/2026),

Time: **90 Minutes**

Max. Marks: 25.

Note: **All questions carry equal marks.**

Q1. Determine whether the sequence $\left\{\binom{n+2}{n}\right\}_{n=1}^{\infty}$ converges or diverges, and if it converges find its limit.

Q2. Find the sum of the series:

$$\sum_{n=0}^{\infty} \left[(-1)^n \left(\frac{2^{2n+1}}{5^n} \right) \right] + \sum_{n=3}^{\infty} \left[\frac{1}{n(4n+8)} \right].$$

Q3. Determine whether the following series is absolutely convergent, conditionally convergent, or divergent: $\sum_{n=2}^{\infty} (-1)^n \frac{1}{n\sqrt{\ln(n)}}.$

Q4. Find the interval of convergence and the radius of convergence of the power series: $\sum_{n=1}^{\infty} \frac{(x+10)^n}{n2^n}.$

Q5. Find the power series representation of the function $f(x) = \frac{-x}{x^3 - 8}$ and then use the first three non-zero terms to approximate the integral $\int_0^1 \frac{-x^{\frac{1}{3}}}{x - 8} dx.$