

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

M-203 (Differential and Integral Calculus)
1st MidTerm Examination (2nd semester 1445) (2023/2024),
Time: 90 Minutes Max. Marks: 25.
Note: All questions carry equal marks.

Q1. Determine whether the sequence $\left\{ \left(\frac{n^2 - 2}{n^2 + 3} \right)^n \right\}$ converges or diverges, and if it converges find its limit.

Q2. Find the sum of the series:

$$\sum_{n=1}^{\infty} \left[\cos \left(\frac{1}{n} \right) - \cos \left(\frac{1}{n+3} \right) \right].$$

Q3. Test the convergence of the series $\sum_{n=1}^{\infty} \frac{3 + \cos(n)}{e^n}$.

Q4. Find the interval of convergence and the radius of convergence of the power series: $\sum_{n=1}^{\infty} \frac{(x+2)^n}{n(-5)^n}$.

Q5. Find the power series representation for the function $f(x) = \frac{x}{(1+x)^2}$ and by using its first three nonzero terms approximate the integral $\int_0^1 \frac{x^2}{(1+x^2)^2} dx$.