KING SAUD UNIVERSITY COLLEGE OF SCIENCE

M203 DEPARTMENT OF MATHEMATICS TIME: 90 Minutes

(SEMESTER 1, 1441)

First Mid-term Exam

Note: All questions carry equal Marks.

Q1. Determine whether the sequence $\{\sqrt{n^4+4n^2}-n^2\}$ converges or diverges and if it converges, find its limit.

Q2. Find the sum of the series: $\sum_{n=3}^{\infty}\left[\frac{2^{3n}}{3^{2n}}+\frac{1}{n^2-3n+2}\right]$.

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

Q4. Find the interval of convergence and the radius of convergence of the power series:

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

Q5. Find the MacLaurin series for the function $f(x)=\tan^{-1}(x)$ up to three non-zero terms and approximate the value of the integral

$$\int_0^{0.1}\tan^{-1}(x^2)\,dx.$$