King Fahd University of Petroleum and Minerals
Quiz 3 Math 102-122 Duration 45 minutes

Full Name: ID:
Section: Serial number:

Question 1 Let

$$f(x)=\begin{cases}\frac{1}{\sqrt{x}} & \text{for } 0<x\leq 3\\ \frac{\ln x}{\sqrt{x}}\,e^{\sin x} & \text{for } 3<x<\infty.\end{cases}$$

Determine if $\int_0^\infty f(x)\,dx$ is convergent or divergent. Justify your answer.

Question 2 Discuss the convergence/divergence of the sequence $\{\sqrt[n]{n}\,(-3)^{1-n}\,e^n\}_{n=1}^{\infty}$.

Question 3 Find the sum of the following series:

a) $\sum_{n=2}^{\infty} \frac{1}{n^2-1}$

b) $\sum_{n=0}^{\infty} \cos(n\pi)\mathrm{e}^{-n}$

Question 4 Determine whether the following series are convergent or divergent. Justify your answer.

a) $\sum_{n=1}^{\infty} \ln\sqrt{\frac{n+1}{n}}$

$b) \sum_{n=2}^{\infty} \frac{\sin(\frac{\pi}{2n}) + \ln(n!)}{n^2(n-1)}$

$c) \sum_{n=1}^{\infty} \left(\frac{n}{n+1} \right)^{2n}$

$d) \sum_{n=0}^{\infty} \frac{(1.3.5 \ldots (2n+1))^3}{n!(2n)!3^n}$