MIDTERM (2)

Kingdom of Saudi Arabia

AL-Imam Mohammed Bin Saud

Islamic University

College of Science

Department of Mathematics

Course name: Calculus II

Course code: MAT 102

Semester: 1st /1437 -1438

Duration: 1:30

Dr. Ghaliah Alhamzi

Name	
Student Number	
Section	

Question's number	Marks
1	/8
2	/8
3	/4
TOTAL	

Question 1

(a) Determine whether the sequence converges or diverges.

(i) $a_n = \dfrac{2n+1}{n}$ (2 Mark)

(ii) $a_n = \dfrac{3n^2+1}{2n^2-1}$ (2 Mark)

(b) Investigate the convergence or divergence of the series by using the limit comparison test,

(i) $\displaystyle\sum_{k=0}^{\infty} \frac{\sqrt{k}}{k^2+1}$ (2 Mark)

(ii) $\displaystyle\sum_{k=8}^{\infty} \frac{k+1}{k^3+2}$ (2 Mark)

Question 2

(a) Show the converges or diverges of the following alternating series

(i) $\sum_{k=1}^{\infty} (-1)^{k+1} \frac{3}{k}$ (2 Mark)

(ii) $\sum_{k=7}^{\infty} (-1)^{k} \frac{2k-1}{k^3}$ (2 Mark)

(b) Determine whether the series is absolutely convergent, conditionally convergent or divergent

(i) $\sum_{k=0}^{\infty} (-1)^k \frac{3}{k!}$ (2 Mark)

(ii) $\sum_{k=1}^{\infty} \left(\frac{4k}{5k+1} \right)^k$ (2 Mark)

Question 3

(a) Find the radius and interval of convergence of the series

$$\sum_{k=0}^{\infty} \frac{2^k}{k!} (x-2)^k \ .$$

(2 Mark)

(b) Find the Maclaurin series (i.e., Taylor series with $c = 0$) and its interval of convergence for $f(x) = e^{2x}$ (2 Mark)