KINGDOM OF SAUDI ARABIA

Ministry of Education

Al-Imam Mohammad Ibn Saud Islamic University

College of Sciences

Department: Mathematics & Statistics

1435/1436H 2nd Semester

Course Code &Number: MAT 106

Course Title: ENG/Calculus 2

Date of Exam:: 09-07-1436H

----------Midterm 2--------

Duration: 75 minutes

Question 1. (2+2 points): Determine whether **two** of the following series converges or diverges. For convergent series find the sum of this series.

1) $\sum_{k=2}^{\infty} \frac{2}{k^2-1}$, 2) $\sum_{k=1}^{\infty} \left(\frac{4}{5}\right)^k$ 3) $\sum_{k=0}^{\infty} \frac{k^2}{k^2+1}$.

Question 2. (4x2 points): Determine whether **four** of the following series are absolutely convergent, conditional convergent or divergent.

1) $\sum_{k=0}^{\infty} \frac{1}{1+k^2}$, 2) $\sum_{k=1}^{\infty} \frac{\sqrt{k}}{k^2+1}$, 3) $\sum_{k=1}^{\infty} \left(\frac{2k}{3k+1}\right)^k$,

4) $\sum_{k=0}^{\infty} (-1)^{k+1} \frac{\sqrt{k}}{k+1}$, 5) $\sum_{k=3}^{\infty} (-1)^{k+1} \frac{k!}{4^k}$.

Question 3. (2 +2 points): Determine the interval and radius of convergence for the power series.

1) $\sum_{k=1}^{\infty} \frac{(x-2)^k}{k5^k}$, 2) $\sum_{k=3}^{\infty} \frac{\ln(k)}{k} x^k$.

Question 4. (2+2 points):

1) Find parametric equations of the line segment joining the points $(-2,4)$ and $(6,1)$.

2)Find the slope of the tangent line for the curve defined by the parametric equations $x = t\cos t, \quad y = t\sin t$ at $t = \frac{\pi}{2}$.