HCMIU - Calculus I - Mid-term Test
Semester 2 - Year: 2021 ∽ 2022 - Duration : 90 minutes
Date Modified : Thursday, June 26th, 2025

INSTRUCTIONS:

- Use of calculator is allowed. Each student is allowed one doubled-sized sheet of reference material (size A4 of similar). All other documents and electronic devices are forbidden
- You must explain your answers in detail; no points will be given for the answer alone.
- There are a total of 5 (five) questions. Each one carries 20 points

Question 1. Test the series for convergence or divergence:

$$\text{(a) } \sum_{n=1}^{\infty} \frac{9^n}{n!n} \qquad \text{(b) } \sum_{n=1}^{\infty} \left(\frac{n}{n+1}\right)^{2n^2}$$

Question 2. Use the sum of the first 10 terms to approximate the sum of the series. Estimate error (find the remainder):

$$\sum_{n=1}^{\infty} \frac{1}{4^n + 1}$$

Question 3. Determine the radius of convergence of the following power series, then test the endpoints to determine the interval of convergence.

$$\sum_{n=0}^{\infty} \frac{(-2)^n (x+3)^n}{3^{n+1}}$$

Question 4. Do the following requests:

(a) Find both the parametric and the vector equations of the line through point $(1, -1, 0)$, that is parallel to the line $x = 3 + 4t, y = 5 - t, z = 7$.

(b) Find the distance between the given point $Q(-2, 5, 9)$ and the line: $x = 5t+7, y = 2-t, z = 12t+4$.

Question 5. Do the following requests:

(a) Find

$$\lim_{t \to 0} \left(\frac{\sin(t)}{t}\mathbf{i} - \frac{e^t - t - 1}{t}\mathbf{j} + \frac{\cos(t) + \frac{t^2}{2}}{t^2}\mathbf{k} \right)$$

(b) Investigate the limit

$$\lim_{(x,y) \to (0,0)} \frac{(x+y)^2}{x^2 + y^2}$$

END OF TEST - BEST OF LUCK