

MA2108
Professor J. Wu

Midterm

1 October 2002

Time allowed: 1.5 hours

Tutorial Group:(circle one)

Tuesday 4-6

Wednesday 9-10

Wednesday 10-11

Wednesday 11-12

Wednesday 12-1

Friday 12-1

Friday 1-2

Matric number:_____

Name:_____

Signature:_____

Problem #	Your Grades
1 (10 points)	
2 (10 points)	
3 (10 points)	
4 (10 points)	
5 (10 points)	
6 (10 points)	
7 (10 points)	
8 (10 points)	
9 (10 points)	
10 (10 points)	
total (100 points)	

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Determine the limit of the following sequences:

1. $\left\{ \cos \left(\frac{n + n^2\pi + 2}{6 + n + 3n^2} \right) + \ln \left(\frac{3n + n^2 + 1}{4 + n^2 + 2n} \right) \right\}.$

2. $\left\{ \frac{\ln n + n^{60}60^n + n!}{3^n + n!} \right\}.$

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3. $\left\{ \sqrt{n}(\sqrt{n+2} - \sqrt{n}) \right\}.$

4. $\left\{ \left(1 - \frac{2}{n+3} \right)^{2n+\ln n} \right\}.$

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Determine convergence or divergence of the following series:

5.
$$\sum_{n=1}^{\infty} \frac{2 \ln n + 4n^2 + 5n - 2}{2n^2 + n^4 + 1}.$$

6.
$$\sum_{n=1}^{\infty} \frac{n^n}{3^n \cdot n!}.$$

Determine the absolute convergence, conditional convergence or divergence of the following series:

7.
$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{\ln n - 2}{\sqrt{n}}.$$

8.
$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1} \sin n}{n ((\ln n)^2 + 1)}.$$

MA2108 Midterm**1 October****Name:** _____**9.** Find limit inferior and limit superior of the sequences:

$$\left\{ \left(1 + \frac{2}{n}\right) \left(1 + \cos \frac{n\pi}{6}\right)^{\frac{1}{n}} \right\}$$

10. Let $\sum_{n=1}^{\infty} a_n$ be a **convergent positive** series. Show that the series $\sum_{n=1}^{\infty} \frac{a_n}{1 + a_n + a_n^2}$ is also convergent.