

MA2108

Midterm

18 March 2003

Time allowed: 1.5 hours

Tutorial Group:(circle one)

Tuesday 9-10

Tuesday 10-11

Wednesday 9-10

Wednesday 10-11

Wednesday 1-2

Wednesday 2-3

Friday 4-6

Matriculation 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. $\left\{ \sin\left(\frac{2+n^2\pi}{6n^2+8}\right) + \ln\left(\frac{3n^3+n^2+1}{4+n^2+3n^3}\right) \right\}$.

2. $\left\{ \frac{2^n + n^{80}80^n + n!}{n! + \ln n} \right\}$.

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

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

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Determine convergence or divergence of the following series:

5.
$$\sum_{n=1}^{\infty} \frac{\ln n + 3n^2 - 2}{2n^2 + n^3 + 1}.$$

6.
$$\sum_{n=1}^{\infty} \frac{n^{2n}}{9^n \cdot (n!)^2}.$$

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

7.
$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{2 + \ln n}{3 + \sqrt{n}}.$$

8.
$$\sum_{n=1}^{\infty} (-1)^{n+1} (1 + \cos n)^n \left(1 - \frac{1}{n}\right)^{n^2}.$$

MA2108 Midterm**18 March****Name:** _____**9.** Find limit inferior and limit superior of the sequences:

$$\left\{ \left(1 + \frac{1}{n} \right) \left(\frac{\sqrt{3}}{2} + \sin \frac{n\pi}{3} \right)^{\frac{1}{n}} \right\}$$

10. Let $\sum_{n=1}^{\infty} a_n$ be a **convergent positive** series. Does the series $\sum_{n=1}^{\infty} \sin(a_n)$ converge? Justify your answer.