

MA2108

Midterm

3 October 2003

Time allowed: 1.5 hours

Tutorial Group:(circle one)

Wednesday 9-10

Wednesday 10-11

Wednesday 11-12

Wednesday 12-1

Thursday 12-1

Thursday 1-2

Thursday 2-3

Thursday 3-4

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

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

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

4. $\left\{ (1 + 2n)^{1/n} \right\}$.

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Determine convergence or divergence of the following series:

5.
$$\sum_{n=1}^{\infty} \frac{2 + \sqrt{n}}{n^2 + 4n + 3}.$$

6.
$$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n(n+1)(n+2)}}.$$

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

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

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

MA2108 Midterm**3 October****Name:** _____**9.** Find limit inferior and limit superior of the sequences:

$$\left\{ \left(\sin \frac{n\pi}{4} \right)^{(-1)^n} \right\}$$

10. Show that the sequence defined by

$$a_1 = 2 \quad a_{n+1} = \frac{1}{3 - a_n}$$

satisfies $0 < a_n \leq 2$ and is monotone decreasing. Deduce that the sequence is convergent and find its limit.