MA2108 **Midterm** **18 March 2002**
Professor J. Wu

Time allowed: 1.5 hours

Tutorial Group:(circle one)

Tuesday 11-12	Tuesday 12-1	Tuesday 1-2
Wednesday 4-5	Friday 10-12	Friday 4-5

ID number:_____

Name:_____

Signature:_____

MA2108 Midterm **18 March** **Name:**_____

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)	

MA2108 Midterm **18 March** **Name:**_____

Determine the limit of the following sequences:

1. $\left\{\sin\left(\dfrac{3+n^2\pi+n}{5+n+2n^2}\right)+\ln\left(\dfrac{n^2+1}{4n+n^2+2}\right)\right\}$.

2. $\left\{\dfrac{n^{50}50^n+n!+\ln n}{n!+2^n}\right\}$.

MA2108 Midterm **18 March** **Name:**_____

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

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

MA2108 Midterm **18 March** **Name:**_____

Determine convergence or divergence of the following series:

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

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

MA2108 Midterm **18 March** **Name:**_____

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

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

8. $\displaystyle\sum_{n=3}^{\infty}\frac{(-1)^{n+1}\cos n}{n\left((\ln n)^2-1\right)}$.

MA2108 Midterm **18 March** **Name:**_____

9. Let $\{a_n\}$ be a bounded sequence of real numbers. Show that

$$\overline{\lim_{n\to\infty}}\, a_n^3 = \left(\overline{\lim_{n\to\infty}}\, a_n\right)^3.$$

10. Let $\sum_{n=1}^{\infty} a_n$ be a series and let $\{b_n\}$ be a bounded sequence. Suppose that $\sum_{n=1}^{\infty} a_n$ is absolutely convergent. Show that the series $\sum_{n=1}^{\infty} a_n b_n$ is also absolutely convergent.