MAT 162 Exam #4 Part A **Name _____**

Column	Points	Score
1	19	
2	21	
3	18	
Total	58	

Instructions:

1. Do all of your work in this booklet.
2. **Show all of your steps** in problems for full credit.
3. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place your **answers in a box**.
5. If you need more space, you may **use the back of the page** and write **On back Page #** in the problem space.

1. Sequences. (9 pts) List the first four terms of each:

a. Sequence: $a_n = \dfrac{\cos np}{n^2}$.

b. A geometric series with $a = 2$ and $r = \dfrac{3}{4}$.

c. Sequence: $a_{n+1} = a_n + \dfrac{1}{a_n}$, $a_1 = 1$.

2. Geometric Series. (10 pts)
Sum the series in (a) and (b):

a. $\displaystyle\sum_{n=1}^{\infty} \frac{5^n}{8^n} =$

b. $\displaystyle\sum_{n=0}^{\infty} \left[\left(\frac{2}{3}\right)^n - \frac{1}{5^n} \right] =$

c. Express $0.\overline{15} = 0.15151515...$ as a ratio of integers.

3. Convergence of Sequences. (18 pts) Determine if the following converge, or diverge. If they converge, find the limit.

a. $a_n = \dfrac{4n-1}{3n+2}$.

b. $a_n = \ln(n+1) - \ln n$.

c. $a_n = \dfrac{n^3}{n^2+3}$.

d. $a_n = \sqrt[n]{5n^2}$.

e. $a_n = \left(\dfrac{3n-1}{3n} \right)^n$.

f. $a_n = \dfrac{n!}{2^n}$.

4. Sum the Series. (3 pts)

Find the sum: $\displaystyle\sum_{1}^{\infty} \frac{1}{n(n+2)} =$

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5. Series Convergence. (18 pts) Determine if the following series converge absolutely, converge conditionally, or diverge. State the test used.

a. $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt[4]{n}}$.

b. $\sum_{n=1}^{\infty} \frac{n+n^2}{n+n^4}$.

c. $\sum_{n=0}^{\infty} \frac{(-1)^n}{3^n}$.

d. $\sum_{n=0}^{\infty} \frac{5^n}{n!}$.

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

f. $\sum_{n=5}^{\infty} \frac{1}{(n-4)^2}$.

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