University of South Carolina

Midterm Examination 2 October 20, 2016

Math 142 Section H03

Closed book examination Time: 75 minutes

Name _____

Instructions:

No notes, books, or calculators are allowed. If you need more space than is provided use the back of the previous page and clearly indicate you have done so. Simplify your final answers. **Full credit may not be awarded for insufficient accompanying work.**

1		12
2		12
3		12
4		12
5		12
6		12
Total		72

1. (12 points) Find the limit of each of the following sequences or explain why the limit does not exist.

(a) $\lim_{n\to\infty} \dfrac{3n^2+n}{4n^2-2}$

(b) $\lim_{n\to\infty} \dfrac{\ln(n)}{n^2}$

(c) $\lim_{n\to\infty} (2n)^{3/n}$

2. (12 points) Find the value of each of the following series or explain why the series diverges.

(a) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$

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

(c) $\sum_{n=0}^{\infty} \frac{2^n + 4}{3^n}$

3. (12 points) For each series, what can you conclude from the given convergence test?

(a) $\sum_{n=1}^{\infty} \frac{2}{n^3}$ using the Integral Test.

(b) $\sum_{n=1}^{\infty} \frac{n^2}{n!}$ using the Ratio Test.

(c) $\sum_{n=1}^{\infty} \frac{n^2}{2^n}$ using the Root Test.

4. (12 points) For each series, what can you conclude from the given convergence test?

(a) $\sum_{n=1}^{\infty} \frac{1}{n^2+4}$ using the Limit Comparison Test with $\sum \frac{1}{n^2}$.

(b) $\sum_{n=4}^{\infty} \sqrt{\frac{n-1}{n^3+1}}$ using the Limit Comparison Test with $\sum \frac{1}{n}$.

(c) $\sum_{n=1}^{\infty} \frac{1}{n^2+4}$ using the Direct Comparison Test with $\sum \frac{1}{n^2}$.

5. (12 points) For each of the following series, determine if it converges or diverges.

(a) $\sum_{n=0}^{\infty} \frac{3^n}{n!}$

(b) $\sum_{n=3}^{\infty} \frac{n+1}{n^2-2}$

(c) $\sum_{n=1}^{\infty} \frac{\ln(n)}{3^{n+2}}$

6. (12 points) For each of the following series, determine if it

- converges absolutely,
- converges conditionally, or
- diverges.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2}$

(b) $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^{n+1}}{n\ln(n)}$

The End