

# Math 1220-003, Summer 2018

## Exam 2 (practice)

Please write your name on the front and back of the exam. Remember to turn off your phone before starting this exam. Show all of your work for full credit. You may not use any notes or calculators during this exam.

Name: \_\_\_\_\_

UID: \_\_\_\_\_

1. (15 points) Determine whether the each of following statements is true or false. If true, write "True." If false, write "False."

(a) If the series  $\sum_{i=1}^{\infty} a_i$  converges, then  $\sum_{i=1}^{\infty} |a_i|$  converges.

(b) If  $\sum_{i=1}^{\infty} b_i$  converges and  $\lim_{i \rightarrow \infty} a_i/b_i = \infty$ , then  $\sum_{i=1}^{\infty} a_i$  diverges.

(c)  $\int_1^{\infty} \frac{1}{x} dx$  diverges.

(d) It  $\lim_{x \rightarrow 1} f(x) = 0$  and  $\lim_{x \rightarrow 1} g(x) = 0$ , then  $\lim_{x \rightarrow 1} \frac{f(x)}{g(x)} = 0$ .

(e) If  $\lim_{n \rightarrow \infty} \frac{a_n}{a_{n+1}} = 1$ , then  $\sum_{n=1}^{\infty} a_n$  diverges.

2. (15 points) Find the following limits. If the limit is infinite, write  $\infty$  or  $-\infty$  accordingly. If the limit does not exist, write “does not exist”.

(a)  $\lim_{x \rightarrow 0} \frac{4x}{\tan x}$

(b)  $\lim_{x \rightarrow \frac{\pi}{2}} \tan x - \sec x$

(c)  $\lim_{x \rightarrow 0^+} (\sin x)^{1/x}$

3. (20 points) Does the integral  $\int_0^3 \frac{x}{(x-2)(x+1)} dx$  converge or diverge? If it converges, find the value of the integral.

4. (15 points) Use the limit comparison test to determine whether the series  $\sum_{i=1}^{\infty} \frac{i-1}{i(1+\sqrt{i})}$  converges.

5. (20 points) Does the series  $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} e^n}{ne^n - 1}$  converge? If so, does it converge conditionally, or absolutely?

6. (15 points) Determine whether or not the series  $\sum_{n=1}^{\infty} \frac{n^2 + 1}{3^n}$  converges.

Name: \_\_\_\_\_

Page	Points	Score
2	15	
3	15	
4	20	
5	15	
6	20	
7	15	
Total:	100	