

# Math 1220-003, Summer 2018

## Exam 2

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." In what follows,  $a_i \geq 0$  and  $b_i \geq 0$  for all  $i$ .

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

(b) If  $\sum_{i=1}^{\infty} b_i$  converges and  $\lim_{i \rightarrow \infty} \frac{a_i}{b_i} = 3$ , then  $\sum_{i=1}^{\infty} a_i$  converges.

(c)  $\int_{-1}^1 \frac{1}{x^5} dx = 0$ .

(d) If  $\lim_{x \rightarrow 2} f(x) = 1$  and  $\lim_{x \rightarrow 2} g(x) = \infty$ , then  $\lim_{x \rightarrow 2} f(x)^{g(x)} = 1$ .

(e) If  $\lim_{n \rightarrow \infty} \frac{a_{n+1}}{a_n} = 3$ , then  $\sum_{n=1}^{\infty} a_n$  diverges.

2. (15 points) Find the integral:

$$\int \frac{x^2 - 2x + 6}{(x + 1)(x - 2)^2} dx$$

3. 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) (10 points)  $\lim_{x \rightarrow \infty} x e^{-x}$

(b) (10 points)  $\lim_{x \rightarrow 0} (\cos x)^{\csc x}$

4. (15 points) Does the following series converge?

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

5. (15 points) Does the following series converge?

$$\sum_{i=1}^{\infty} \frac{i^2 + 1}{3^i}$$

6. For each of the following series, say whether it diverges, converges conditionally, or converges absolutely.

(a) (10 points)  $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{4^n}$

(b) (10 points)  $\sum_{n=2}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n^2 + 1}}$

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

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