

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

Student Number: \_\_\_\_\_

Section Number: \_\_\_\_\_

Instructor: \_\_\_\_\_

**MATH 113 – EXAM 3 – PART 2**  
NOVEMBER 13–16, 2012

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**Instruction:**

1. This is the second of two parts.
  2. Simplify your answers.
  3. Notes, books, and calculators are not allowed.
  4. For questions that require a written answer, show all your work. Full credit will be given only if the necessary work is shown to justify your answer.
  5. Should you need more space than is allocated to answer a question, use the back of the page the problem is on and indicate this fact. Scratch paper will not be graded.
  6. Please do not talk about the test with other students until after the last day of the exam
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Problem	Possible	Earned
MC	44	
12	10	
13	8	
14	6	
15	8	
16	6	
17	6	
18	6	
19	6	
TOTAL	100	

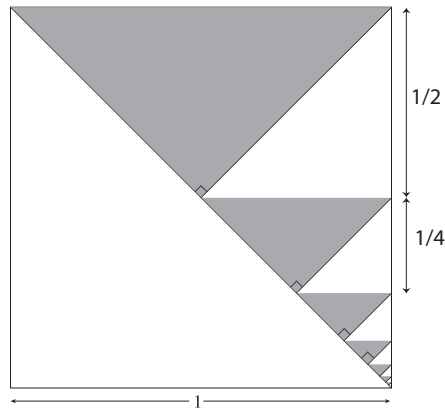
12. Determine whether the sequence is convergent or divergent. If it is convergent, find its limit. Please show work justifying your answer.

(a) (3 pts)  $a_n = \frac{\cos(n)}{n!}$

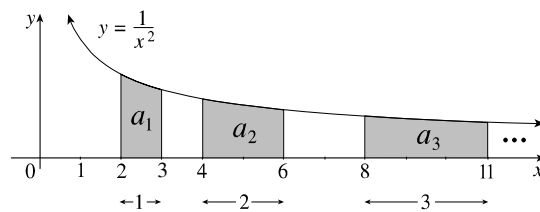
(b) (3 pts)  $a_n = \frac{(-1)^n n}{2n - 1}$

(c) (4 pts)  $a_n = \frac{1}{5} \cdot \frac{3^n}{n!}$

13. (a) (4 pts) Compute the sum of the shaded areas for the figure below (note that the figure is square)



- (b) (4 pts) Does the series  $\sum a_n$  illustrated below converge or diverge? Explain. You must clearly indicate the test(s) of convergence you used or the reasoning behind your answer.



14. (6 pts) Determine whether the series  $\sum_{k=1}^{\infty} \frac{1}{n \sqrt{\ln(n)}}$  converges or diverges. You must clearly indicate the test(s) of convergence you used.

15. (a) (4 pts) Determine whether the series  $\sum_{n=1}^{\infty} \frac{2 - \cos(n)}{n^{1.1} + 1}$  is convergent or divergent. You must clearly indicate the test(s) of convergence you used.

- (b) (4 pts) Determine whether the series  $\sum_{n=1}^{\infty} \frac{n^{3/4} + 1}{n^2 + 3\sqrt{n} + 1}$  is convergent or divergent. You must clearly indicate the test(s) of convergence you used.

16. (6 pts) Determine whether the series  $\sum_{n=1}^{\infty} \frac{1}{n + \ln(n)}$  is convergent or divergent. You must clearly indicate the test(s) of convergence you used.

17. (6 pts) Determine whether each of the following series absolutely converges, conditionally converges, or diverges. State clearly which test you used.

(a) 
$$\sum_{k=1}^{\infty} (-1)^k \frac{k+2}{4k^2+3}$$

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

18. (6 pts) Determine whether each of the following series converges or diverges. State clearly which test you used.

(a) 
$$\sum_{k=1}^{\infty} (-1)^k \frac{10^k}{k!}$$

(b) 
$$\sum_{k=1}^{\infty} k^{-3} e^k$$



19. (6 pts) Determine whether each of the following series converges or diverges. State clearly which test you used.

(a) 
$$\sum_{k=1}^{\infty} \left( \frac{4k}{5k+1} \right)^k$$

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