Name:______________________________

Student ID:______________________________

Section:______________________________

Instructor:______________________________

Math 113
Exam 3 PART B
Winter 2013

TWO PART EXAM
YOU CAN WRITE ON PART B

Instructions for Part B:

- Calculators are not allowed.
- Simplify your answers.
- Work on scratch paper will not be graded.
- For question 11, fill in each blank. No work will be graded.
- For questions 12 through 17, show all your work in the space provided.
- Should you have need for more space than is allotted, use the back of the page the problem is on and indicate this fact.
- Please do not discuss the exam with other students until after the last day to take the exam.

#	Possible	Earned
M.C.	30	
11	13	
12	7	
13(a)	5	
13(b)	5	
13(c)	5	
Subtotal	65	

#	Possible	Earned
14(a)	5	
14(b)	5	
14(c)	5	
15	8	
16	4	
17	8	
Subtotal	35	
Overall	100	

PART B: FREE RESPONSE

11. Fill in each blank. No work will be graded for this problem.

   (a) (3 points) Find an explicit formula for the general term of the sequence.

   $$a_1 = 4,\ a_2 = -2,\ a_3 = 1,\ a_4 = -\frac{1}{2},\ a_5 = \frac{1}{4}, \dots \qquad a_n = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_$$

   (b) (3 points) Find the limit of $a_n = \dfrac{(-1)^n(n+2)}{n}$ or say that it diverges.

   ____

   (c) (3 points) Find the limit of $a_n = \sin\left(\dfrac{1+\pi n^2}{n^2+1}\right)$ or say that it diverges.

   ____

   (d) (2 points) If a sequence is convergent then it must be monotone. True or false?

   ____

   (e) (2 points) A decreasing sequence of positive terms must be convergent. True or false?

   ____

12. (7 points) Find a power series that is an antiderivative for $\dfrac{x}{1+x^4}$ on the interval $(-1, 1)$.

CONTINUE TO THE NEXT PAGE

13. (5 points each) For each series, state whether it is convergent or divergent. In the space provided, show adequate justification for your conclusion, citing any necessary series tests. **POINTS WILL NOT BE AWARDED IF NO WORK IS SHOWN!!**

(a) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{3n-1}{n+1}\right)^n$

Circle your conclusion:

Convergent

Divergent

(b) $\displaystyle\sum_{n=2}^{\infty} \frac{n!}{n^n}$

Circle your conclusion:

Convergent

Divergent

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{2n^2+n+3}{4n^3-\sqrt{n}+1}$

Circle your conclusion:

Convergent

Divergent

CONTINUE TO THE NEXT PAGE

14. (5 points each) For each series, state whether it is absolutely convergent, conditionally convergent, or divergent. In the space provided, show adequate justification for your conclusion, citing any necessary series tests. **POINTS WILL NOT BE AWARDED IF NO WORK IS SHOWN!!**

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

Circle your conclusion:

Absolutely Convergent

Conditionally Convergent

Divergent

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

Circle your conclusion:

Absolutely Convergent

Conditionally Convergent

Divergent

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

Circle your conclusion:

Absolutely Convergent

Conditionally Convergent

Divergent

CONTINUE TO THE NEXT PAGE

15. (4 points each)

(a) The series below is convergent. Find the number of terms necessary to approximate its sum to within 0.01.

$$\sum_{k=1}^{\infty} \frac{9}{k^2}$$

(b) Use s_3 and integrals to create a lower and upper bound for the sum of the series in part (a).

CONTINUE TO THE NEXT PAGE

16. (4 points) The series below is convergent. Determine how many terms of the series must be added so that $|R_n|$ is less than 10^{-3}.

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

17. (8 points) Find the interval of convergence for the power series: $\displaystyle\sum_{n=0}^{\infty} \frac{2^n (x+2)^n}{n+2}$

END OF EXAM