Midterm 2 practice 2

UCLA: Math 31B, Spring 2017

Instructor: Noah White
Date:
Version: practice

- This exam has 4 questions, for a total of 40 points.
- Please print your working and answers neatly.
- Write your solutions in the space provided showing working.
- All final answers should be exact values. Decimal approximations will not be given credit.
- Indicate your final answer clearly.
- Full points will only be awarded for solutions with correct working.
- You may write on the reverse of a page or on the blank pages found at the back of the booklet however these will not be graded unless very clearly indicated.
- Non programmable and non graphing calculators are allowed.

Name: _____

ID number: _____

Discussion section: _____

Question	Points	Score
1	8	
2	10	
3	15	
4	7	
Total:	40	

1. Calculate the following limits using any technique you like.

   (a) (4 points)

   $$\lim_{x \to 0+} x(\ln x)^2$$

   (b) (4 points)

   $$\lim_{x \to 0+} x^{\sin x}.$$

2. For each of the following improper integrals say whether it converges or diverges. If the integral converges, you should say what value it converges to.

   (a) (5 points) $\int_0^\infty \frac{2x}{(1+x^2)^2}\ dx$.

   (b) (5 points) $\int_0^1 \ln x\ dx$.

3. For each of the following series say whether it converges or diverges. You do NOT need to justify your answer.

   Grading scheme: 0 points for wrong, 1 point for no response, 3 points for correct.

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

   (b) (3 points) $\sum_{n=2}^{\infty} \frac{n}{\sqrt{n^5-4}}$.

   (c) (3 points) $\sum_{n=0}^{\infty} \frac{2n}{(1+n^2)^2}$ (*Hint: once of the previous questions in the midterm might help*).

   (d) (3 points) $\sum_{n=1}^{\infty} a_n$ where the sequence of partial sums $(s_N)_{N=1}^{\infty}$ is described by

   $$s_N = N^{\sin N}.$$

   (e) (3 points) $\sum_{n=1}^{\infty} a_n$ where the sequence of partial sums $(s_N)_{N=1}^{\infty}$ is described by

   $$s_N = \sum_{n=1}^{N} n^{\sin n}.$$

4. (7 points) Does the series $\sum_{n=1}^{\infty} \sqrt[n]{n} - 1$ converge or diverge? Full points will only be given to solutions that justify the answer clearly.

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