Math 31B   Last Name (Print): _____
Summer C 2016
Midterm 2   First Name (Print): _____
August 29, 2016
Time: 9:00 AM to 10:00 AM   Student ID: _____

Do not open the exam until instructed to do so.

Enter all requested information on the top of this page.

This exam contains 6 pages (including this cover page) and 5 problems.

You may *not* use your books, notes, or any calculator on this exam.

You are required to show your work on each problem on this exam.

- **When you use a convergence test you must indicate this** and show how the conditions for the test are satisfied.

- **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit. **Please box your final answers.**

- **Mysterious or unsupported answers will not receive full credit**. A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.

- If you need more space, use the back of the pages; **clearly indicate when you have done this**.

Problem	Points	Score
1	20	
2	20	
3	15	
4	20	
5	25	
Total:	100	

Do not write in the table to the right.

Manage your time well! If you get stuck on a problem, try working on something else and come back to it later.

1. For each of the following series, **evaluate it** using the formula for the sum of geometric series or show that it diverges.

   (a) (10 points)

   $$\frac{1}{2} - \frac{1}{2^2} + \frac{1}{2^3} - \frac{1}{2^4} + \cdots$$

   (b) (10 points)

   $$\sum_{n=2}^{\infty} e^n$$

2. (a) (10 points) Compute the third degree Taylor polynomial $T_3(x)$ for $\ln(x)$ centered at 1.

(b) (10 points) Compute error bound for

$$|T_3(1.3) - \ln(1.3)|$$

3. (15 points) Starting from Maclaurin series

$$\frac{1}{1-x} = 1 + x + x^2 + x^3 + \cdots = \sum_{n=0}^{\infty} x^n$$

derive Maclaurin series for the following function:

$$\frac{1}{(1-x^2)^2}$$

(you do *not* need to specify for which x the expansion is valid).

4. (20 points) Compute the interval of convergence for the following power series:

$$\sum_{n=1}^{\infty} \frac{(x-1)^n}{n(-2)^n}$$

5. For each of the following series, determine whether it converges or diverges:

(a) (8 points)

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

(b) (8 points)

$$\sum_{n=2}^{\infty} \frac{\ln(n) + n^2}{n^3 - 5}$$

(c) (9 points)

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