

Math 126: Calculus II
Exam II November 9, 2000

Name: _____
Instructor: _____

There are 7 problems on 7 pages worth a total of 84 points. You start with 16 points. Each part of a problem is worth the same number of points.

You may use a calculator if you wish.

To receive partial credit on a problem, you must *show your work and all important steps*. No credit will be given for an answer if no work is shown.

1. (12 pts) Evaluate the integrals.

a) $\int x e^{2x} dx$

b) $\int \frac{\sqrt{x^2 + 1}}{x^4} dx$

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2. (6 pts) Find the partial fraction decomposition of $\frac{x+2}{x^2(x^2+1)}$.

3. (6 pts) Compute the value of the series $\sum_{n=1}^{\infty} \frac{3^n + 2(-1)^{n+1}}{4^n}$.

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4. (12 pts) Find the limit of each sequence, or show it does not exist.

a) $a_n = \frac{(-1)^n n}{n+1}$

b) $a_n = n \sin(1/n)$

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5. (12 pts) Consider the series $s = \sum_{n=1}^{\infty} \ln\left(\frac{n}{n+1}\right)$.

a) Compute the 4th partial sum, s_4 , exactly.

b) Find the value of s or show the series diverges.

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6. (24 pts) Determine whether the following series converge.

a) $\sum_{n=2}^{\infty} \left(1 - \frac{1}{n}\right)^n$

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

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c)
$$\sum_{n=2}^{\infty} \frac{1}{n(\ln(n))^3}$$

d)
$$\sum_{n=1}^{\infty} \frac{5^n}{n^3}$$

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7. (12 pts)

a) Show that the series $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n!}{(2n-1)!}$ converges.

b) Find an approximate value of the sum of the series with an error which is less than 10^{-2} . Be sure to explain why the error is less than 10^{-2} .