Math 1432 - Exam III Name:_____
Morgan, Spring 2003 Social Sec.:_____

Answer problems 1-12 in the spaces provided below.

Questions (5 points each)	**Answers**
1. Give the exact value of $\sum_{n=2}^{\infty} \frac{\cos(\pi n)}{2^n}$.	
2. Give the exact value of $\sum_{n=2}^{\infty} \frac{1}{n^2+n}$.	
3. Suppose $f(x) = \sum_{n=0}^{\infty} \frac{x^{2n-1}}{(2n)!}$. Give the 16th derivative of f at $x = 0$.	
4. Give the 5th degree Taylor polynomial for $f(x) = \cosh(x)$ centered at 0.	
5. Give the Taylor series expansion for $f(x) = \cos(x)$ centered at 0.	
6. Give the value for the improper integral $\int_{-1}^{1} \frac{1}{x^2 - 2x + 1} dx$.	
7. Does $\sum_{n=2}^{\infty} \frac{n^2+3n-2}{4n^4+n-1}$ converge or diverge?	
8. Does $\sum_{n=1}^{\infty} \frac{n^2+3n-2}{\sqrt{4n^7+n-1}}$ converge or diverge?	
9. Does $\sum_{n=2}^{\infty} \frac{(-1)^n}{n\ln(n)}$ converge absolutely, converge conditionally, or diverge?	
10. Does $\sum_{n=0}^{\infty} \frac{(-1)^n n!}{3^n}$ converge absolutely, converge conditionally, or diverge?	

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11. $f(1) = -2,\ f'(1) = 1,\ f''(1) = -3$. Give the 2nd degree Taylor polynomial for f centered at 1.	
12. Rewrite $f(x) = -3x^3 + 5x^2 - x + 1$ in powers of $(x+2)$.	

Write the solutions to Problems 13-17 in your blue book. Show all of your work.

13. (5 points) Give the interval of convergence for the power series $\sum_{n=1}^{\infty} \frac{x^n}{3n^2+1}$.

14. (10 points) Give a power series representation for each of $f(1) = \frac{1}{1+x}, g(x) = \ln(1+x)$, and $h(x) = \frac{1}{(1+x)^2}$, and give the radius of convergence in each case.

15. (10 points) Give a value of n so that the Taylor polynomial of degree n for $f(x) = \sin(2x)$ centered at 0 can be used to approximate $f(x)$ within 10^{-4} on the interval $\left[-\frac{1}{2}, \frac{1}{2}\right]$.

16. (15 points) Determine whether the following series converge absolutely, converge conditionally or diverge.

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

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

c. $\sum_{n=2}^{\infty} \frac{(-1)^n}{5n^2 + 2n - 1}$

d. $\sum_{n=2}^{\infty} \frac{\cos(\pi n) n^n}{n!}$

e. $\sum_{n=2}^{\infty} \left(\frac{n}{n+1}\right)^n$

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