MATH 152 Mrs. Bonny Tighe

## EXAM III 100 points 12.4-11.2

NAME \_\_\_\_\_\_ Wednesday 11/30/05

There are 11 problems worth 10 points each.

1. Test the series for convergence or divergence. **State the test** you use and show all work. If the series is an Alternating Series, find if it is Absolutely or Conditionally convergent.

a) Use the Comparison Test

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

b) Use the Ratio Test

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

2. Test the series for convergence or divergence. State the test used.a) Use the Integral testb) Use the Limit Comparison Test

a) Use the Integral test

 $\sum_{n=2}^{\infty} \frac{dx}{x\sqrt{\ln x}}$ 

$$\sum_{n=1}^{\infty} \frac{\sin(\frac{1}{n})}{\sqrt{n}}$$

3. Express the function  $f(x) = \coth^{-1}(x^2)$  as a power series by first finding it's derivative,  $f'(x) = \frac{1}{1-x^4}$ , as a power series and then integrating. Find the interval of convergence.

4. Express the function as the sum of a power series by first using partial fractions. Find the interval of convergence.  $f(x) = \frac{3}{x^2 + x - 2}$ 

5. Evaluate the indefinite integral as an infinite series.  $\int \frac{\cos x}{x} dx$ 

6. Find the sum of the series.

a) 
$$\sum_{n=0}^{\infty} \frac{2^n}{3^n n!} =$$

b) 
$$\sum_{n=0}^{\infty} \frac{(-1)^n 9^n}{(2n)!} =$$

7. Find the Taylor series for f(x) centered at the given value of a and find its radius of convergence.  $f(x) = \ln x$ , centered at a = 2

8. Find the Maclaurin series of f(x) and its radius of convergence.

 $f(x) = \frac{1}{\sqrt{x}}$ 

9. Expand  $\frac{x}{\sqrt{4-x}}$  as a power series using the binomial series. State the radius of convergence.

10. Find the length of the curve,  $x = \sin 2\theta$ ,  $y = \cos 2\theta$ ,  $0 \le \theta \le \pi$ 

11. Find the radius and interval of convergence for the power series:

a) 
$$\sum_{n=1}^{\infty} \frac{2^n (x-1)^n}{1 \cdot 4 \cdot 7 \cdot 10 \cdots (3n-2)}$$
 b)  $\sum_{n=1}^{\infty} \frac{(-1)^n 3x^{2n}}{n \ln(n+1)}$