MATH 152 **EXAM IIIA** NAME ___________________

Mrs. Bonny Tighe 100 points Wednesday 11/30/05

12.4-11.2

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 a Use the Integral test

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

b) Use the Comparison Test

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

2. Test the series for convergence or divergence

a) Use the Limit Comparison Test

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

b) Use the Ratio Test

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

3.. Express the function $f(x) = \coth^{-1}(\sqrt{x})$ as a power series by first finding it's derivative, $f'(x) = \dfrac{1}{1-x}$, 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. $f(x) = \dfrac{3}{x^2 + x - 2}$

5. Evaluate the indefinite integral as an infinite series. $\displaystyle\int \frac{\sin 2x}{x^2}\,dx$

6. Find the sum of the series. a) $\sum_{n=0}^{\infty} \frac{2^n}{5^{n+1} n!} =$

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

7. Find the Maclaurin series of f(x) and its radius of convergence. $f(x) = \ln(1 + x)$

8. Find the Taylor series for f(x) centered at the given value of a and find its radius of convergence. $f(x)=\frac{1}{\sqrt{x}},\ centered\ \ at\ \ a=9$

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

10. Expand $\dfrac{3x^2}{\sqrt{4+2x}}$ as a power series using the binomial series. State the radius of convergence.

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

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

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