Mathematics 116 Print Name: _____
Problem Set
Due Friday, May 2, 2008 Signature: _____

Your signature is your pledge that you have adhered to the guidelines for problem sets and take-home examinations.

If this problem set it submitted by the next to the last class of the semester, it will be graded and returned at the last class.

1. Write down an effective strategy for determining whether an infinite series converges. *Explain the strategy using plain language, using complete sentences and avoiding the use of mathematical notation. Indeed, note that if you are tempted to use mathematical notation, then you are not writing down a strategy.*

(2-10): Determine whether the indicated improper integral or infinite series converges. In the case of a convergent infinite series, determine whether the convergence is absolute or conditional. Justify your conclusion.

2. $\displaystyle\int_2^\infty \frac{\sqrt{x}}{x^2-1}\,dx$
3. $\displaystyle\sum_{n=2}^\infty \frac{(-1)^n\sqrt{n}}{n^2-1}$
4. $\displaystyle\int_0^\infty \frac{x}{x^2+1}\,dx$
5. $\displaystyle\sum_{n=2}^\infty \frac{(-1)^n n}{n^2+1}$
6. $\displaystyle\int_2^\infty \frac{1}{\ln x}\,dx$
7. $\displaystyle\sum_{n=2}^\infty \frac{(-1)^n}{\ln n}$
8. $\displaystyle\int_0^\infty \frac{1+\cos x}{e^x}\,dx$
9. $\displaystyle\sum_{n=0}^\infty \frac{(-1)^n(1+\cos n)}{2^n}$
10. $\displaystyle\sum_{n=0}^\infty \frac{(-1)^n 2^n}{n!}$

11. Find the fifth degree Taylor Polynomial $T_5(x)$ centered at 0 for the function $(x^2-4)^3$.

(12-16): Consider the polar curve $r = 1 + \sin(4\theta)$, $0 \leq \theta \leq 2\pi$.

12. Sketch its graph.

13. Find the area of the region enclosed by the curve.

14. Write down an integral whose value is the length of the curve. *Do not evaluate the integral.*

15. Write down an integral whose value is the area of the surface obtained by rotating the curve about the x-axis. *Do not evaluate the integral.*

16. Write down an integral whose value is the area of the surface obtained by rotating the curve about the y-axis. *Do not evaluate the integral.*

Extra Credit: An American quarter has a diameter of approximately 24 millimeters, with the tip of George Washington's head lying approximately 2 millimeters from the edge of the coin. Suppose a quarter is placed on its edge with the tip of our first president's head directly above the center of the quarter and rolled along a straight line at a speed of 3 centimeters per second. Set up an appropriate coordinate system along with appropriate variables and use parametric equations to express the position of the tip of George's head in terms of the amount of time the coin has been rolling. Assume the dimensions given are exact and the coin will roll forever.

Extra Credit

Extra credit will be awarded for the best joke. All jokes must observe standards of good taste. The determination of the best joke will be made by popular vote in class when the