Final Exam

Math 175, Calculus II, Fall 2012

Section: 01

Name: ______________________________

This test is closed book. You may use notes from an index card. Calculators of any kind are **not** allowed. You must clearly show your work to receive credit. Unless otherwise stated, you do not need to simplify your answer. [redacted]

1. Evaluate $\int \frac{5}{16+x^2}\,dx$.

2. Find $\lim_{x\to\infty}(e^x+x)^{1/x}$. Identify all indeterminate forms that appear in your solution and clearly indicate any uses of L'Hopital's rule.

3. Evaluate $\int 3x \sin(2x)\, dx$.

4. Evaluate $\int 3x^2 \tan^3(x^3) \sec^5(x^3)\, dx$.

5. Evaluate $\int \frac{5}{(9+x^2)^{3/2}}\, dx$.

6. Evaluate $\int \frac{x^2+3}{x^2-9}\, dx$.

7. Evaluate $\int_0^8 \frac{1}{\sqrt[3]{x}}\,dx$. Evaluate any limits that appear. You **must** use proper notation to receive full credit.

8. Evaluate $\int_1^\infty x^{-1/3}\,dx$. Evaluate any limits that appear. You **must** use proper notation to receive full credit.

9. Does $\sum_{k=4}^{\infty} 10\left(\frac{5}{2}\right)^{-k}$ converge or diverge? If it converges find the **exact value** of the sum. Otherwise, show that it diverges.

10. Does $\sum_{k=17}^{\infty}\left(\frac{4k}{5k+3}\right)^{2k}$ converge or diverge? State any convergence tests used.

11. Does $\sum_{k=1}^{\infty} \frac{k^3+k-1}{k^5+4k^3-3}$ converge or diverge? State any convergence tests used.

12. Does $\sum_{k=1}^{\infty} (-1)^{k+1} \frac{1}{k}$ converge conditionally or absolutely? State any convergence tests used.

13. Find the interval of convergence for the power series $\sum_{k=1}^{\infty}(-1)^k k x^k$.

14. Use Taylor series to compute $\int_0^1 x^2 \cosh(x^2)\, dx$. Your answer will be an infinite series. You may write your answer in summation notation or you may write out the first **three** terms of the series.

15. A circle of radius 7 is centered at the origin. Set up a polar integral that gives the area of one-fourth of this circle.

16. A hanging chain is described by the parametric equations

$$x = t \quad \text{and} \quad y = \cosh t$$

for $-3 \leq t \leq 3$. Find the length of this chain. *Hint*: You can use the identity $1+\sinh^2 t = \cosh^2 t$ to simplify your integral.