April 27, 2009

Lab 11: Final Exam Review

TEAM MEMBERS

_____

_____

INSTRUCTIONS: Work the following problems with your teammate, and write up your solutions neatly, clearly and carefully. Both members of the team should understand and be able to explain the solutions.

1. Compute the following integrals:

   (a) $\int_{-5}^{5} \frac{x^2+1}{x}\, dx$

   (b) $\int 8\sqrt{1-x^2}\, dx$

(c) $\int \ln x \; dx$

(d) $\int \frac{\sin(\ln x)}{x} \; dx$

(e) $\int \cos^3 x \, dx$

2. Do the following series converge or diverge? Be sure to explain your answers including which test(s) you used!

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{n^4 + 5n^3 - 6n + 4}{4n^7 - \sqrt{n}}$.

(b) $\displaystyle\sum_{n=0}^{\infty} \frac{2^{3n+1}}{7^n - 1}$.

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

(d) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{e^{1/n}}$

3. The ratio test was applied to the power series $\sum_{n=3}^{\infty} c_n(x-4)^n$ to find its radius of convergence. The following was found:

$$\lim_{n\to\infty}\left|\frac{c_{n+1}(x-4)^{n+1}}{c_n(x-4)^n}\right| = \left|\frac{x-4}{3}\right|.$$

What is the radius of convergence for this power series?

4. Find the Maclaurin Series for the following functions:

(a) $f(x) = \dfrac{1}{1-x}$

(b) $f(x) = e^x$

(c) $f(x) = \arctan x$

(d) $f(x) = \cos x$

(e) $f(x) = \sin x$

(f) $f(x) = (x + 4)^3$