`NAME:

Rec. Instructor:

Math 221 – Analytic Geometry and Calculus 2

Final Exam, Summer 2013

In order to receive full credit (or any credit at all), answers **must be** justified. Put a box around your final answer so the grade knows what your solution is. Use exact numerical answers, **NOT** calculator-generated answers. Solutions do not need to be completely simplified in order to receive full credit. The point value of each problem appears in parenthesis.

(**15) Problem 1.** Pick one of the following indefinite integrals and evaluate (do not do both only one will be graded.)

$$\int \frac{x^3}{\sqrt{4-x^2}}\,\mathrm{d}x \qquad \text{or} \qquad \int \frac{x^2}{(x-1)^2(x+1)}\,\mathrm{d}x$$

(15) Problem 2. The region under the graph of $f(x) = x^{-2}$, from x=1 to x=∞, is revolved about the x-axis. Determine whether the volume of the resulting solid of revolution is finite or infinite. If it is finite, find the volume.

(15) Problem 3. Pick one of the following problems and solve (do not do both only one will be grade.)

(a) Find the center of mass of the 1-st quadrant region bounded by the x-axis, the line x= π , and the graph of $f(x)=\sin(x)$. (Can use symmetry here).

Or

(b) Find the surface area of the objected obtained by rotating the graph of $f(x)=x^3$ on [0,2] about the x-axis.

(15) Problem 4. Find the fluid pressure exerted on a semi-circular region of radius 2 submerged into water so that the diameter is level with the surface of the water. (water has a density of 1000kg/m^3 and gravity is about 9.8m/s^2.)

(15+5) Problem 5. (a) Compute the Taylor series of the function $f(x) = \ln(1+x)$ centered at c=1

(b). Find the radius (not the interval) of convergence of the power series found in **(a)**.

(5+5+5+5) Problem 6. For each of the following series determine if it converges or diverges. You **MUST** make sure to clearly state **which test** you are using and what **the conclusion** of that test is.

(a) $\sum_{n=2}^{\infty}(-1)^n \frac{n^2}{n^2+1}$

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

(c) $\sum_{n=0}^{\infty}\frac{n}{\sqrt{n^3-n+10}}$

(d) $\sum_{n=0}^{\infty}\frac{1}{e^n}$