Math 1232 Practice Final

Instructor: Jay Daigle

1. This test is due at the scheduled exam time. Logistically, this will work just like the mastery quizzes: download it, write up your answers, and upload them to Blackboard for us to grade.
2. You will have three hours for this test. Please write down your start and end times on the test and include that in your upload. You may not spend more than two hours on the test unless you have a specific accommodation.
3. You are not allowed to consult books or notes during the test, but you may use a two-page cheat sheet you have made for yourself ahead of time. Please upload your sheet along with your test.
4. If you have questions, I will be online and responsive during the scheduled exam time. If you want to take the test at a time you know I'll be able to answer any questions quickly, I encourage you to use that time slot.
5. You may use a calculator, but don't use a graphing calculator or anything else that can do symbolic computations. Using a calculator for basic arithmetic is fine.

Name:

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Problem 1.

(a) $\displaystyle\int \sin x \cos 2x \, dx$

(b) $\displaystyle\int_0^{\pi} \sin^4(x) \, dx$

(c) $\displaystyle\int_{\sqrt{7}}^{2\sqrt{7}} \frac{dx}{x\sqrt{x^2-7}}$

(d) $\displaystyle\int_1^{+\infty} \frac{1}{x^2-2x} \, dx$

Problem 2.

(a) Analyze the convergence of $\displaystyle\sum_{n=2}^{\infty} \frac{3(-1)^n}{n\ln(n)}$.

(b) Analyze the convergence of $\displaystyle\sum_{n=1}^{\infty} (-1)^n \left(\frac{5n+7}{8n-4}\right)^n$.

(c) Analyze the convergence of $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{n^3+n^2+n+1}{\sqrt{n^9}}$.

Problem 3.

(a) Find the radius and interval of convergence of $\displaystyle\sum_{n=0}^{\infty} \frac{(x-3)^n}{(2n)^2+1}$.

(b) Find a power series for $x^2 \arctan(x^2)$ centered at 0.

(c) Find the Taylor series for $f(x) = \frac{3}{x^3}$ centered at 3.

Problem 4.

(a) Find the slope of the tangent line to the curve defined by the polar equation $r = 2 + \sin(3\theta)$ at the point $\theta = \pi/4$.

(b) Find the solution to $y' = x^2y^3$ if $y(0) = 1$.

(c) Find the area of the surface obtained by rotating the curve $x = 1 + 2y^2$ for $1 \leq y \leq 2$ about the x-axis.

Problem 5.

(a) Let $g(x) = \sqrt[5]{x^9 + x^7 + x + 1}$. Find $(g^{-1})'(1)$.

(b) Approximate $\displaystyle\int_1^5 3^x \, dx$ with four intervals and Simpson's Rule.

(c) Use a second-degree Taylor polynomial to approximate $\sqrt[4]{82}$.