problem	1	2	3	4	5	6	7	total
scores								

Exam #1, September 28, Calculus II (109), Fall, 2011, W. Stephen Wilson

I agree to complete this exam without unauthorized assistance from any person, materials or device.

Name (signature): ———————————————————————— Date: ————————————

Name (print): ————————————————————————

TA Name and section: ————————————————

NO CALCULATORS, NO PAPERS, NOT MUCH PARTIAL CREDIT, SHOW WORK.
(22 points total)

There is an extra page to show work on for each problem.

1. (4 points total) Using substitutions, turn $\int \frac{dx}{(x^2+4x+8)^3}$ into and integral with trig functions in the denominator (and none in the denominator). (2 points) for getting the trig functions right and (2 points) for getting the numbers right.

Space for problem # 1.

2. (2 points) Write $\frac{3x^2+2x+5}{(x^3+x^2-x-1)(x^2+4x+8)^3}$ in terms of partial fractions, but don't solve for the constants, just set up the form this should be written in terms of.

Note that $x^3+x^2-x-1 = (x+1)^2(x-1)$, so

$$\frac{3x^2+2x+5}{(x+1)^2(x-1)(x^2+4x+8)^3} = \frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{x-1} + \frac{Dx+E}{x^2+4x+8} + \frac{Fx+G}{(x^2+4x+8)^2} + \frac{Hx+I}{(x^2+4x+8)^3}$$

2. (2 points) Write $\frac{3x^2+2x+5}{(x^3+x^2-x-1)(x^2+4x+8)^3}$ in terms of partial fractions, but don't solve for the constants, just set up the form this should be written in terms of.

Space for problem # 2.

3. (2 points) Compute $\int \frac{\sqrt[3]{x}\,dx}{\sqrt[5]{x}}$. Show work.

Space for problem # 3.

4. (2 points) Solve for y in $y' - y = 1$ using separation of variables. Show work.

Space for problem # 4.

5. (2 points) Solve for y in $y' - y = 1$ using an integration factor. Show work.

Space for problem # 5.

6. (4 points total) (2 points) Find the family of curves perpendicular to the family of curves given by $x^2 + y^2 = 2x + 2y + k$. (2 points) These are all familiar curves, explain, very briefly (like one sentence) what is going on.

Space for problem # 6.

7. (6 points total) We have 1 liter of water with .01 Kg. of salt in it. We add water with .05 Kg/liter of salt in at the rate of 1 cm^3/sec. We assume instant mixing. We drain water at the rate of 3 cm^3/sec. What will the salt density (in Kg./Liters) be just as the liter becomes empty. (Do not make the stupid mistake of not knowing when the container is empty.) $e^{-3/2}$ is approximately .223. What is the answer to 3 decimal places? (2 points for the correct differential equation, 2 points for the solution to the differential equation, and 2 point for getting the final number right)

This problem was not counted. It was intended as a variation on problems I had worked in class, but I got the physics wrong. It can be worked correctly, but I did not work any problems like it. That would be okay, but one TA did, so that class would have had an advantage. Anyway, I goofed badly and this was not used. The exam was thus a 16 point exam.

Space for problem # 7.