NAME:_____

TQS 125 **CALCULUS & ANALYTIC GEOMETRY II** Winter 2008

EXAM # 2

Read through the entire test before beginning. The question sheet should have 7 (plus one bonus) questions. You are to write your answers on the blank white paper provided. Please

- write on only one side of a piece of paper;
- put your name on each piece of paper;
- clearly label each solution;
- keep your solutions in numbered order.

You may use your calculator and ask me questions if you find a problem unclear. Please be sure to show your work. *Unsupported answers will be counted as minimally correct.*

If you have time and the inclination, please consider filling out the *Reality Check*. I am asking you to reflect on how well you think you did on the exam. The student(s) who guess(es) closest to their actual score will be given a 2 point bonus. (If you know your score exactly, the bonus increases to 3 pts.)

Good luck and remember—you know quite a lot. Rely on your instincts and common sense. If something doesn't seem right, ASK! If you have no idea how to get started on a problem, ASK! If you are stuck, ASK! The worst thing that can happen is I look at you and say "You should know that."

Problem	Grade	Reality Check	Points
1			30
2			10
3			10
4			10
5			15
6			15
7			10
Bonus			5
Total	/100	/100	105

Useful information:

$$\int \sec x dx = \ln|\sec x + \tan x| + C$$

$$\int \sec^2 x dx = \tan x + C$$

$$\int \sec^n x dx = \frac{1}{n-1}\tan x \sec^{n-2} x + \frac{n-2}{n-1}\int \sec^{n-2} x dx$$

1. For each integral below, state what method you would use to evaluate the integral:

   substitution, trigonometric substitution, integration by parts, partial fraction decomposition, or numerical approximation.

   Indicate any substitution or assignment of parts that you would make but DO NOT EVALUATE.

   (a) $\int \frac{6\sin(2x)}{\cos^2(2x)}dx$

   (b) $\int (11x-4)\sin(3x)dx$

   (c) $\int \tan^2 x \sec^4 x dx$

   (d) $\int \frac{x^2-5x+13}{(x^2+3)(x-2)}dx$

   (e) $\int \frac{e^x}{x}dx$

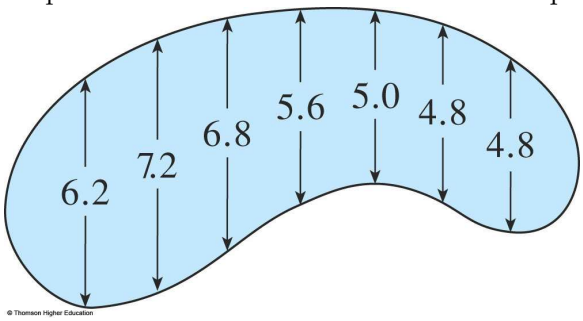
   (f) $\int_0^3 x\sqrt{25-x^2}dx$

2. Determine the convergence of the given improper integral $\int_1^2 \frac{1}{x(\ln x)^2}dx$.

3. If f is increasing and concave up on the interval $[-1, 5]$, put the following quantities in ascending order. What feature of the graph of f helps you to put the quantities in ascending order?

$$M_{50}, \qquad T_{50}, \qquad \int_{-1}^{5} f(x)dx$$

4. The width in meters of a kidney shaped swimming pool was measured in 2-meter intervals as indicated below. Use Simpson's Rule to estimate the area of the pool.



5. Find the partial fraction decomposition for $\frac{3x^2-x+2}{(x^2+1)(x-4)}$.

6. Find the exact length of the curve $y = 4 - 5x^2$ from $x = 0$ to $x = 1$.

7. Compare and contrast the different numerical techniques for approximating definite integrals. Why is it so important to have these techniques?

* **Bonus Question.** Explain one mathematical topic that you studied to prepare for this examination but feel you did not get the opportunity to adequately show your knowledge. (In other words, *WOW* me with some of your mathematical knowledge.)