NAME:_____

TQS 125 **Calculus & Analytic Geometry II** Spring 2008

EXAM # 1

Read through the entire test before beginning. The question sheet should have 4 (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			30
3			30
4			10
Bonus			5
Total	/100	/100	105

1. Find the indefinite integral **(/30)**

   (a) $\displaystyle\int \frac{(\ln x)^2}{x}dx$

   (b) $\displaystyle\int \frac{x^5+x+1}{x^2}dx$

   (c) $\displaystyle\int \frac{\sin\sqrt{x}\cos\sqrt{x}}{\sqrt{x}}dx$

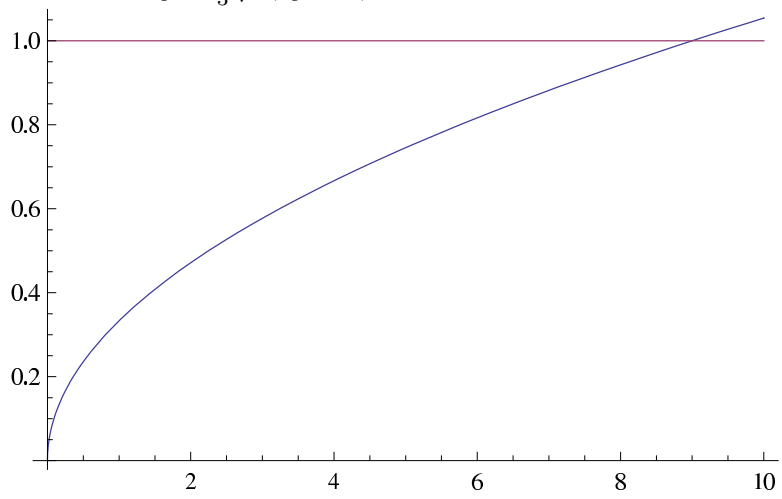
2. Evaluate **(/30)**

   (a) $\displaystyle\int_{\ln 3}^{\ln 4} e^{2x}dx$

   (b) $F'(5)$ provided $F(x)=\int_5^x t\sin(t^2)dt$

   (c) $\displaystyle\frac{d}{dx}\int_0^{\tan x}\frac{dt}{1+t^2}$

3. Consider the three curves $y=\frac{1}{3}\sqrt{x}$, $y=1$, and $x=0$. **(/30)**



   (a) Find the area enclosed by the three given curves.

   (b) Find the volume of the solid of revolution obtained by rotating the enclosed region about the x-axis.

   (c) Set-up (but do not solve) the integral to compute the volume of the solid of revolution obtained by rotating the enclosed area about the line $x=-2$.

4. *Pumping seawater.* To design the interior surface of a stainless-steel tank, you revolve the curve $y=x^2$, $0\le x\le 4$, about the y-axis. The container is to be filled with seawater, which weighs 10,000 N/m^3. How much work will it take to empty the tank by pumping water to the tank's top? **(/10)**

* **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.) **(/5)**