TQS 125   CALCULUS & ANALYTIC GEOMETRY II   Winter 2008
EXAM # 1

Read through the entire test before beginning. Make sure you have 10 (plus one bonus) questions on 6 pages. 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			10
4			10
5			20
Bonus			5
Total	/100	/100	105

1. Find the indefinite integral (/30)

(a) $\int \sin^3 x \cos x dx$

(b) $\int \left(x + \frac{1}{x}\right)^2 dx$
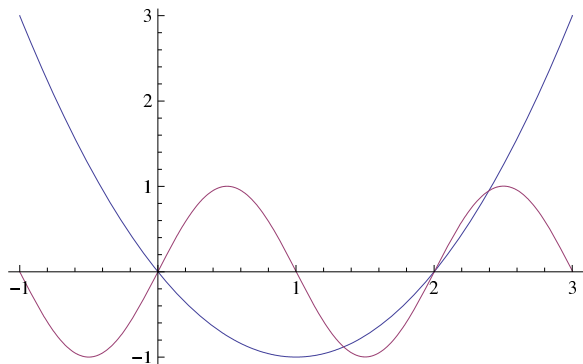
(c) $\int x \sec(x^2) \tan(x^2) dx$

2. Evaluate $\qquad$ ($\quad$ /30)

(a) $\displaystyle\int_4^9 x\sqrt{x}\,dx$

(b) $\displaystyle\frac{d}{dx}\int_{10}^x \frac{\ln t}{t}\,dt$

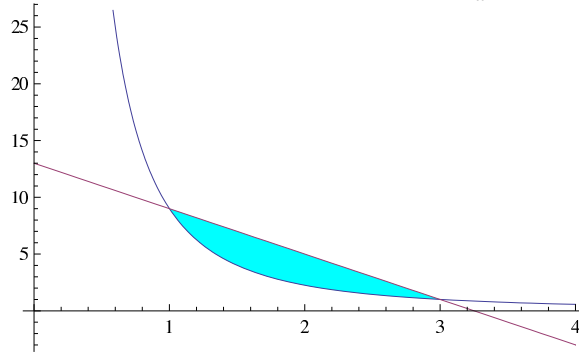(c) $\displaystyle\frac{d}{dx}\int_0^{\sqrt{x}} \cos\sqrt{t}\,dt$

3. Sketch the region whose area is given by the definite integral $\int_{-4}^{4} \sqrt{16 - x^2} dx$. Then use geometry to determine the value of the integral. (/10)

4. Set up integrals to compute the total region enclosed by the two curves $f(x) = x^2 - 2x$ and $g(x) = \sin(\pi x)$. DO NOT COMPUTE. (/10)

5. Let R be the region in the first quadrant bounded by $y = \frac{9}{x^2}$ and $y = 13 - 4x$.   (/20)

Set up integrals to compute the volumes of the solids of rotation. In each case, sketching and labeling a representative dV created by rotating a small rectangle would be an excellent idea. WHATEVER YOU DO, DO NOT EVALUATE THE INTEGRALS!

(a) An integral that computes the volume of the solid generated by rotating R around the x-axis.

(b) An integral that computes the volume of the solid generated by rotating R around the line $x = -2$.

* **Bonus Question.** *Please answer on back.* 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)