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

**EXAM # 1**

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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."

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| 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 **( /30)**

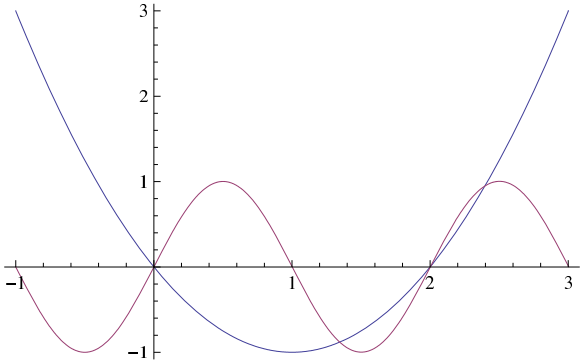
   (a) $\int_4^9 x\sqrt{x} dx$

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

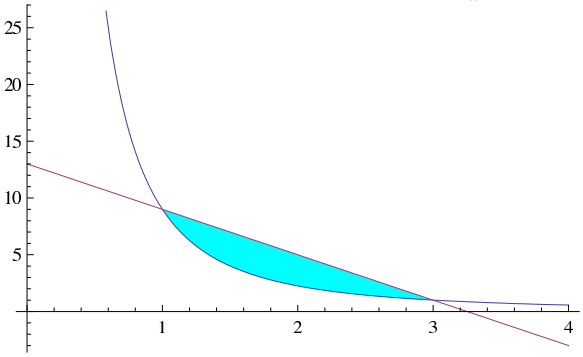
   (c) $\frac{d}{dx} \int_0^{\sqrt{x}} \cos \sqrt{t} dt$

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)**