MATH 152 — Quiz #1

February 6, 1997

Please make sure you received 6 pages (including this cover page) with 5 problems. You have 45 minutes for the exam, and you may attempt the problems in any order. You may use a two-page summary of your notes during this exam. No other help is allowed. Write your answers in the space provided. If you need more space, attach additional pages. Show your work for problems 2c, 2d, 4 and 5.

Good Luck!

Name:	
Student number:	

Problem	Maximum	Points received
1	20	
2	20	
3	20	
4	20	
5	20	
Total	100	

Problem 1 Find an antiderivative F of the function f ($F(x) = \int f(x)dx$). Check the appropriate box for all correct answers. Note that at least one and at most two answers are correct. (5 points for each function, 1 point for checking "do not know"; **do not check more than one answer!**). C is a generic constant. *Hint:* $\frac{d}{dx}\tan x = 1 + \tan^2 x$.

	$f(x) =$	$F(x) = \int f(x)dx =$	check		$f(x) =$	$F(x) = \int f(x)dx =$	check
a)	$3x + \frac{1}{3x}$	$\frac{3}{2}x^2 + \ln\lvert 3x\rvert + C$	☐	c)	$\tan^2 x$	$\tan x - 1 + C$	☐
		$\frac{3}{2}x^2 + \frac{1}{3}\ln\lvert x\rvert + C$	☐			$\tan x + x + C$	☐
		$\frac{3}{2}x^2 + \frac{1}{3}\ln\lvert 3x\rvert + C$	☐			$\tan x + C$	☐
		$x^3 + \frac{1}{3}\ln\lvert 3x\rvert + C$	☐			$\frac{1}{3}\tan^3 x + C$	☐
		None of the above	☐			None of the above	☐
		Do not know	☐			Do not know	☐
b)	$3x^2 + 3x^{-2}$	$x^3 + 3x^{-1} + C$	☐	d)	$\ln(2x)$	$\frac{1}{2x} + C$	☐
		$x^3 - 3x^{-1} + C$	☐			$x\ln(2x) - x + C$	☐
		$x^3 - x^{-3} + C$	☐			$2x\ln(2x) - 2x + C$	☐
		$x^3 + x^{-3} + C$	☐			$x\ln x + x\ln 2 - x + C$	☐
		None of the above	☐			None of the above	☐
		Do not know	☐			Do not know	☐

Problem 2 What are the values of the following definite integrals. Check the appropriate box (exactly one answer is correct). 5 points for each function, 1 point for checking "do not know"; **do not check more than one answer!**.

(a)			(b)		
$\int_{-1}^{+1}(x-x^3)dx$	$\frac{1}{2}$	☐	$\int_0^{\pi/2}\sin x\cos x dx$	$\frac{1}{2}$	☐
	$\frac{1}{4}$	☐		0	☐
	$-\frac{1}{2}$	☐		π	☐
	$-\frac{1}{4}$	☐		1	☐
	None of the above	☐		None of the above	☐
	Do not know	☐		Do not know	☐

(c) $\int_0^{\pi/3}\sin u du =$, (d) $\int_0^2 |x^2-1|dx =$

Problem 3 What is ... (the function g is continuous and differentiable) (4 points each)

$$\frac{d}{dx}\left(\int_0^x e^{t^2}\,dt\right) =$$

$$\int_0^x \frac{d}{dt}(t^2 - t)\,dt =$$

$$\frac{d}{dx}\left(\int_1^2 \ln t\,dt\right) =$$

$$\frac{d}{dt}\left(\int_t^2 x\,dx\right) =$$

$$\frac{d}{dx}\left(\int_{-x}^{x^2} g(t)\,dt\right) =$$

Problem 4 (20 points) Find the area of the finite region bounded by the curves

$$y = \frac{1}{2}x^2 \qquad \text{and} \qquad y = 2 - x - \frac{1}{2}x^2.$$

Problem 5 (20 points) Find volume of the solid obtained by rotating the region bounded by the curves

$$y^2 = x \qquad \text{and} \qquad x = 2y$$

about the y-axis. Sketch the region, the solid, and a typical disk or "washer".