

MATH 162Q, Quest Calculus IIA

Workshop #4

Due Monday October 19, 2009

Group members are required to write up solutions individually. It is important that you write up solutions in your own words. You should explain not only what, but also why you decided to do what you did. You should think of this as an opportunity to reflect on the process that will lead you to a correct solution to similar problems.

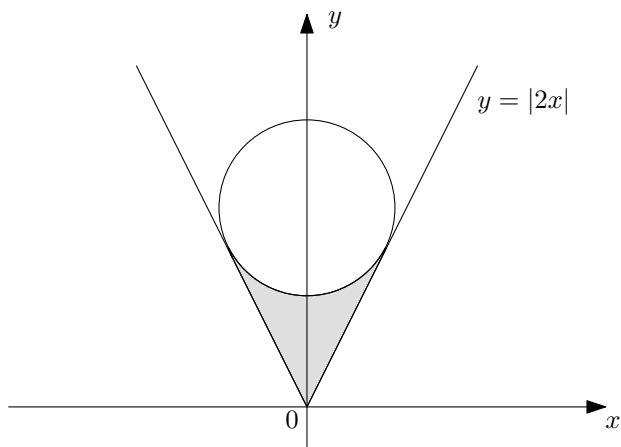
Please use this as a cover sheet to your workshop writeup. Make sure all work is stapled and turn it into the professor before class on the due date.

NAME: _____

Please list all your group members, and on a scale from **1 (low)** - **5 (high)** rank your and their participation in the workshop. This will not affect grades, rather, it will supply the professor and TA with workshop feedback.

Group Member	Participation

Problem 1. The circle with radius 1 shown in the figure touches the curve $y = |2x|$ twice. Find the area of the (shaded) region that lies between the two curves.



Problem 2. Prove that if f is a continuous function, then

$$\int_0^a f(x) dx = \int_0^a f(a-x) dx$$

Problem 3. Use Problem 2. to show that

$$\int_0^{\pi/2} \frac{\sin^n x}{\sin^n x + \cos^n x} dx = \frac{\pi}{4}$$

for all positive numbers n .

Problem 4. If n is a positive integer, prove that

$$I_n = \int_0^1 (1-x^2)^n dx = \frac{2^{2n}(n!)^2}{(2n+1)!}$$

where $n!$ (n factorial) is defined as $n! = n(n-1)(n-2)\cdots 3 \cdot 2 \cdot 1$.

Hint: Find a formula for I_n in terms of I_{n-1} .