

PRINT Your Name: _____

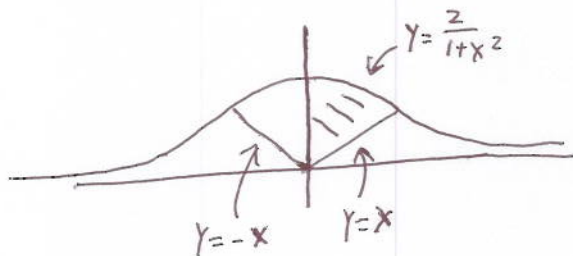
Quiz 3 — September 4, 2009 — 8:00 section

Remove everything from your desk except this page and a pencil or pen.

Circle your answer. Show your work.

The quiz is worth 5 points.

Find the area between $y = \frac{2}{1+x^2}$ and $y = |x|$.



The picture is symmetric. We find the shaded area and double it.
To find the intersection we solve $y = x$ and $y = \frac{2}{1+x^2}$ simultaneously

$$x = \frac{2}{1+x^2} \quad x(1+x^2) = 2 \quad x^3 + x - 2 = 0$$

The only possible rational roots are factors of -2 (the constant term) divided by factors of 1 (the leading coefficient.) The only possible rational roots are $\pm 1, \pm 2$. Of course 1 is a root, the intersection

point is $(1, 1)$

$$\text{Area} = 2 \int_0^1 \text{top} - \text{bot} \, dx = 2 \int_0^1 \left(\frac{2}{1+x^2} - x \right) dx$$

$$= 2 \left(2 \arctan x - \frac{x^2}{2} \right) \Big|_0^1 = 2 \left(2 \frac{\pi}{4} - \frac{1}{2} \right) = \pi - 1$$