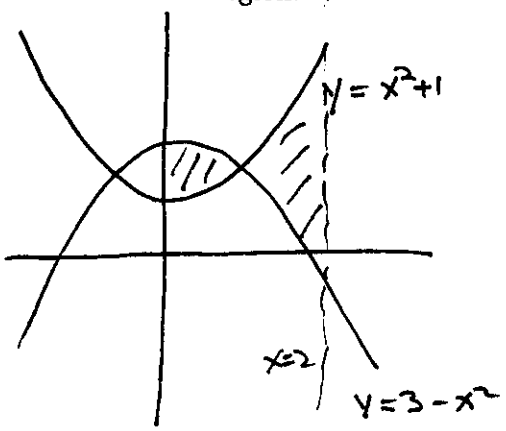
Math 1184
Quiz 1

Name (print) Key

Spring 2002

Work carefully and neatly. You must show all relevant work! You may receive no credit if there is insufficient work. Graphing calculators are not allowed!

[5] 1. Sketch the region enclosed by the curves $y = x^2 + 1, y = 3 - x^2, x = 0, x = 2$. Then find the area of the region.



$x^2+1 = 3-x^2$

$2x^2 = 2$

$x^2 = 1$

$x = 1$ on interval

$$\int_0^1 [(3-x^2) - (x^2+1)]\,dx - \int_1^2 [(x^2+1) - (3-x^2)]\,dx$$

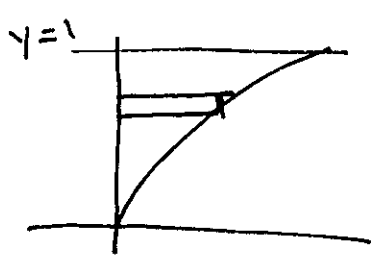
$$= \int_0^1 (2-2x^2)\,dx + \int_1^2 (2x^2-2)\,dx$$

$$= 2x - \tfrac{2}{3}x^3\Big|_0^1 + \tfrac{2}{3}x^3 - 2x\Big|_1^2$$

$$= (2 - \tfrac{2}{3}) - 0 + \left[(\tfrac{16}{3} - 4) - (\tfrac{2}{3} - 2)\right] = 2 - \tfrac{2}{3} + \tfrac{16}{3} - 4 - \tfrac{2}{3} + 2$$

$$= \tfrac{16}{3} - \tfrac{4}{3} = \tfrac{12}{3} = \boxed{4}$$

[5] 2. The region bounded by the curves $y = x^{2/3}, y = 1$ and $x = 0$ is revolved around the y-axis. What is the volume of the solid?



$\pi r^2 \Delta y = \pi x^2 \Delta y$

$y = x^{2/3}$

$y^{3/2} = x$

$y^3 = x^2$

So $\pi x^2 \Delta y = \pi y^3 \Delta y$

$$\pi \int_0^1 y^3\,dy = \tfrac{1}{4}\pi y^4\Big|_0^1 = \boxed{\tfrac{1}{4}\pi}$$