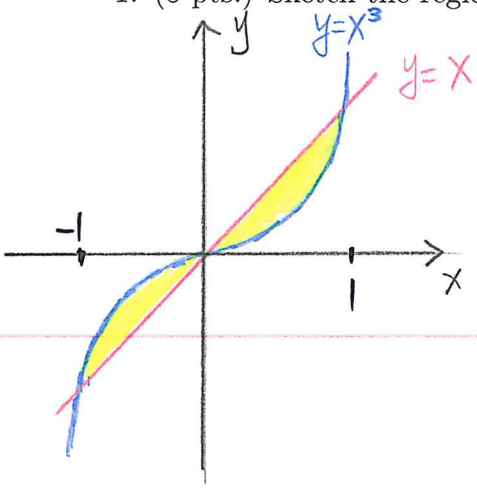
Name: Solutions

Quiz No. 2
Sections 1202, 1203
02/07/19

1. (5 pts.) Sketch the region enclosed by the given curves and find its area.



$y = x^3, y = x$

intersection $x^3 = x$

$x^3 - x = 0$

$x(x^2-1) = 0$

$x(x+1)(x-1) = 0$

$x = 0, -1, 1$

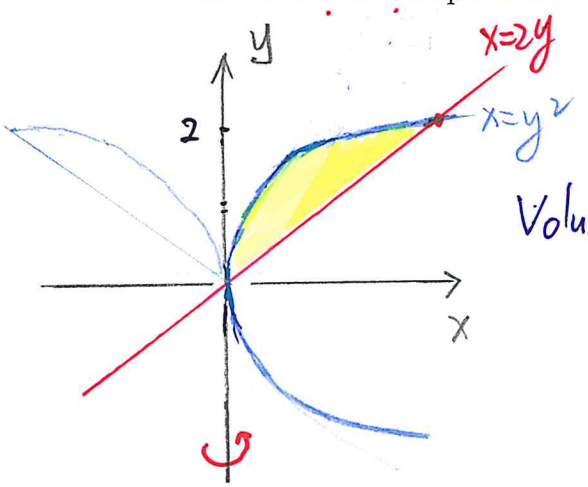
$$\text{Area} = \int_{-1}^{0} x^3 - x \, dx + \int_{0}^{1} x - x^3 \, dx$$

$$= \frac{x^4}{4} - \frac{x^2}{2}\Big|_{-1}^{0} + \frac{x^2}{2} - \frac{x^4}{4}\Big|_{0}^{1}$$

$$= 0 - \left(\frac{1}{4} - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{4}\right) - 0$$

$$= \frac{1}{2}$$

2. (5 pts.) Find the volume of the solid obtained by rotating the region bounded by the given curves about the specified line.



$x = y^2$, $x = 2y$; about the y-axis

intersection

$y^2 = 2y$

$y^2 - 2y = 0$

$y(y-2) = 0$

$y = 0, 2$.

$$\text{Volume} = \int_0^2 A(y) \, dy$$

$$= \int_0^2 \pi (2y)^2 - \pi (y^2)^2 \, dy$$

$$= \pi \int_0^2 4y^2 - y^4 \, dy$$

$$= \pi \left(\frac{4y^3}{3} - \frac{y^5}{5}\right)\Big|_0^2 = \pi\left(\frac{4(8)}{3} - \frac{32}{5}\right) = \frac{64\pi}{15}$$