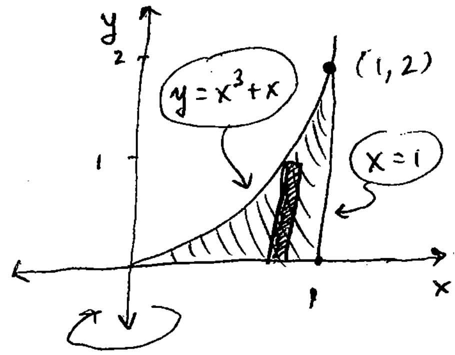
Quiz 3

Name key　　　　　　Row ______

Find the volumes of the solids obtained by revolving the shaded regions around the y-axis. You need not simplify your answer.

[10]

1. The region between the curve $y = x^3 + x$, the line $x = 1$, and the x-axis.



$$V = \int_0^1 2\pi x y \, dx$$

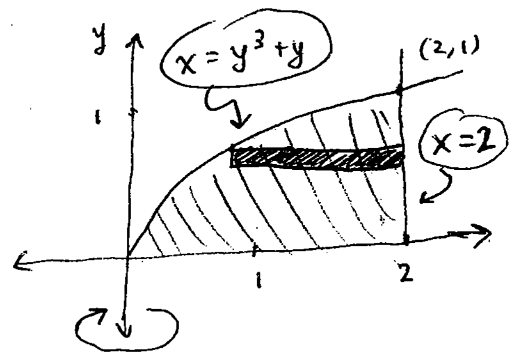
$$= \int_0^1 2\pi x(x^3+x)\, dx$$

$$= 2\pi \int_0^1 (x^4 + x^2)\, dx$$

$$= 2\pi \left[\frac{x^5}{5} + \frac{x^3}{3} \right]_0^1 = 2\pi \left[\frac{1}{5} + \frac{1}{3} \right] = 2\pi \cdot \frac{8}{15} = \frac{16\pi}{15}$$

[10]

2. The region between the curve $x = y^3 + y$, the line $x = 2$, and the x-axis.



$$V = \int_0^1 \left\{ \pi(2)^2 - \pi(y^3+y)^2 \right\} dy$$

$$= \pi \int_0^1 \left\{ 4 - (y^6 + 2y^4 + y^2) \right\} dy$$

$$= \pi \left[4y - \frac{y^7}{7} - \frac{2y^5}{5} - \frac{y^3}{3} \right]_0^1$$

$$= \pi \left[4 - \frac{1}{7} - \frac{2}{5} - \frac{1}{3} \right] = \frac{328\pi}{105}$$