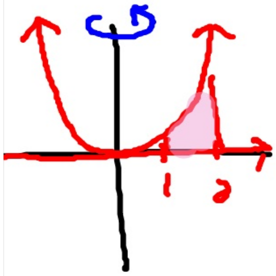
ulus 1 Volume of Solids of Rotation Name______________________

ksheet – Method of Shells (A) Date______________________

rch the graphs, shade the bounded region, draw a typical shell, set up the integral volume, and calculate the volume.

$= x^2 \quad x = 1$ *and* $x = 2$, $y = 0$ about the y-axis



Area: T B

Rotate: R L

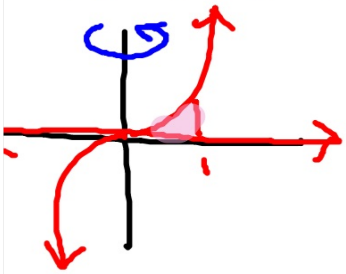
$\int 2\pi x (T - B)$

$$\int_1^2 2\pi x (x^2 - 0)\,dx$$

$$\int_1^2 2\pi x^3$$

$$2\pi\left(\frac{1}{4}x^4\right)\Big|_1^2 = \boxed{23.562}$$

2) $y = x^3 \quad x = 1 \quad and \quad y = 0$ - about the y-axis



Area: TB
Rotate: RL

$\int 2\pi x\,(T-B)$

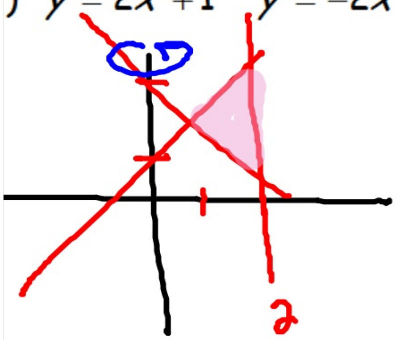
$\int_0^1 2\pi x(x^3-0)\,dx$

$\int_0^1 2\pi\, x^4\,dx$

$2\pi\left(\frac{1}{5}x^5\right)\Big|_0^1$

$\boxed{1.257}$

) $y = 2x + 1 \quad y = -2x + 3 \quad and \quad x = 2$ - about the y-axis



Area: T B

Rotate: RL

$$\int 2\pi x (T - B)$$

$$\int_{.5}^{2} 2\pi x \left((2x+1) - (-2x+3) \right) dx$$

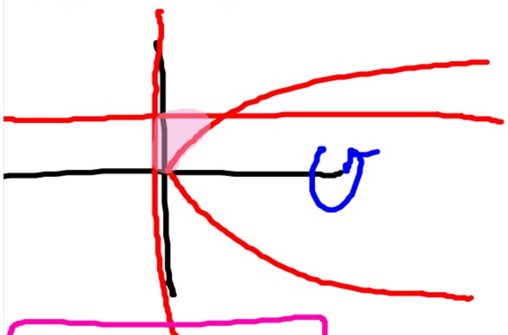
$$\int_{.5}^{2} 2\pi x (4x - 2)\, dx$$

$$\int_{.5}^{2} 2\pi (4x^2 - 2x)\, dx$$

$$2\pi \left(\frac{4}{3} x^3 - x^2 \right) \Big|_{.5}^{2}$$

42.412

4) $y^2 = x \quad y = 1 \quad and \quad x = 0$ - about the x-axis



Area: RL
Rotate: TB

$\int 2\pi y(R-L)$

$\int_0^1 2\pi y(y^2-0)\,dy$

$\int_0^1 2\pi y^3\,dy$

$2\pi\left(\frac{1}{4}y^4\right)\Big|_0^1$

2nd Method

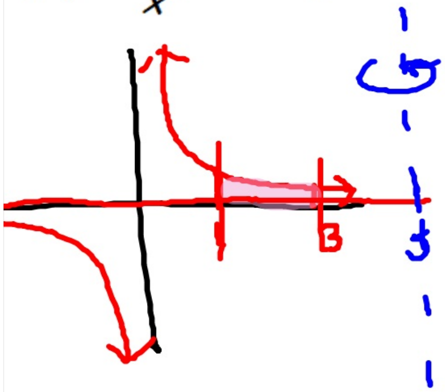
Area: TB
Rotate: TB

$\int_0^1 \pi\left(1^2-(\pm\sqrt{x})^2\right)dx$

$\int_0^1 \pi(1-x)\,dx$

$\pi\left(x-\frac{1}{2}x^2\right)\Big|_0^1$ → 1.571

5) $y = \frac{1}{x}$, $x = 1$, $x = 3$ $y = 0$ about the line $x = 5$



Area: TB

Rotate: RL

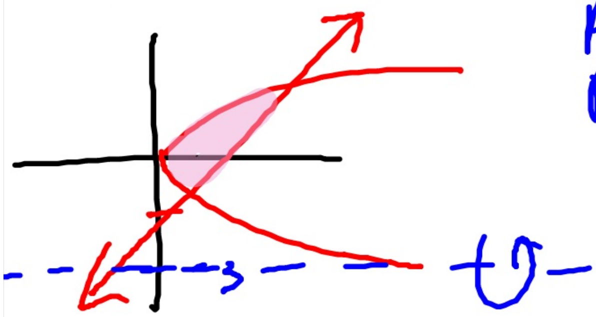
$\int 2\pi x (T - B)$ ← change

$$\int_1^3 2\pi(5 - x)\left(\frac{1}{x} - 0\right)dx$$

$$\int_1^3 2\pi(5 - x)\left(\frac{1}{x}\right)dx$$

21.948

) $x = y^2$ and $x = y + 2$ about the line $y = -3$



Area: RL

Rotate: TB

$\int 2\pi y (R - L)$

$$\int_{-1}^{2} 2\pi\,(y - {-3})\,(y + 2 - y^2)\,dy$$

$$\int_{-1}^{2} 2\pi\,(y + 3)\,(y + 2 - y^2)\,dy$$

98.96