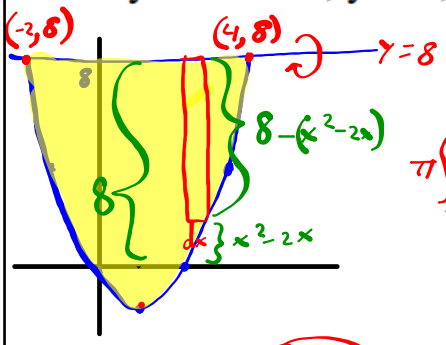
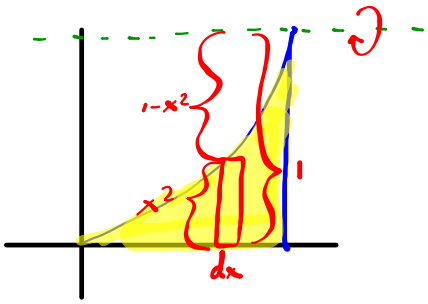
1. $y = x^2 - 2x$, $y = 8$; about the line $y = 8$



$$\pi\int_{-2}^{4}\left(8-(x^2-2x)\right)^2 dx$$

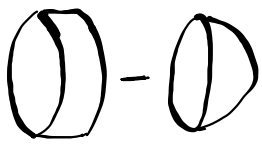
2. $y = x^2$, $x = 1$, $y = 0$; about the line $y = 1$



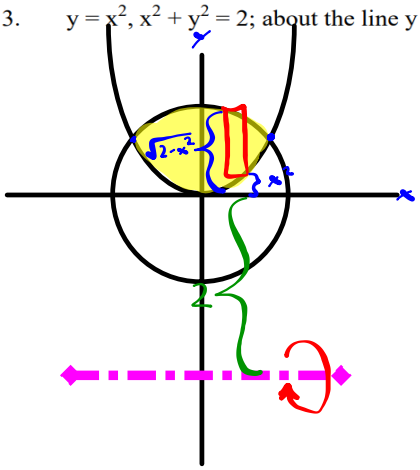
washer
$R^2 - r^2$ ← 2 integrals into one

$$\pi\int_0^1\left((\ 1\ )^2-(1-x^2)^2\right)dx$$

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

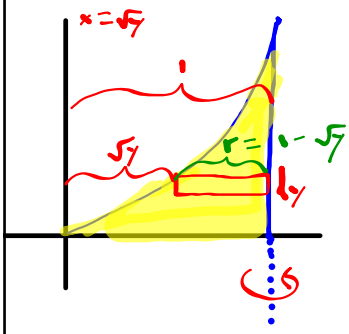


3. $y = x^2$, $x^2 + y^2 = 2$; about the line $y = -2$ [Set this up only.]



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

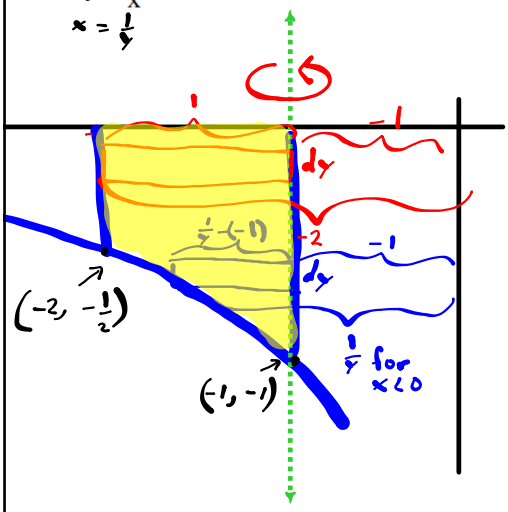
4. $y = x^2$, $x = 1$, $y = 0$; about the line $x = 1$



$$\pi\int_{0}^{1}\left(1-\sqrt{y}\right)^2 dy$$

5. $y = \frac{1}{x}$, $x = -2$, $x = -1$, about the line $x = -1$

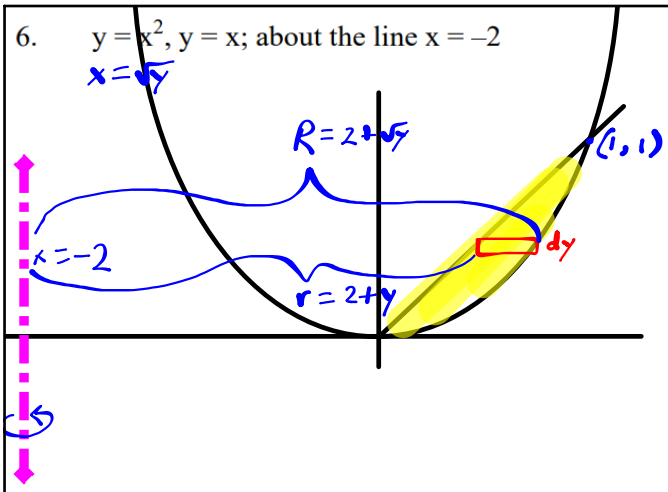
$x = \frac{1}{y}$



$$\pi\int_{-\frac{1}{2}}^{0}(-2-(-1))^2\,dy + \pi\int_{-1}^{-\frac{1}{2}}\left(\frac{1}{y}-(-1)\right)^2 dy$$

6. $y = x^2$, $y = x$; about the line $x = -2$

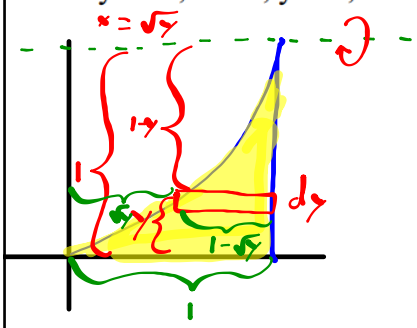
$x = \sqrt{y}$



$$\pi(R^2 - r^2)$$

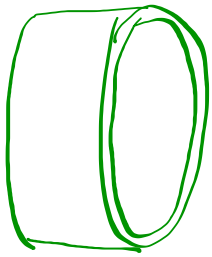
$$\pi\int_0^1\left((2+\sqrt{y})^2 - (2+y)^2\right)dy$$

7. $y = x^2$, $x = 1$, $y = 0$; about the line $y = 1$

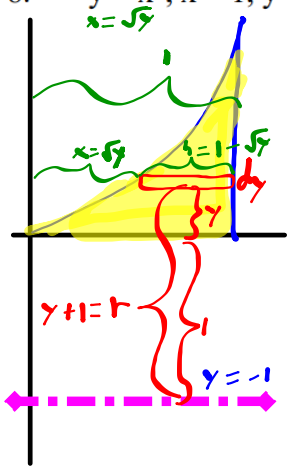


$2\pi r h$

$$2\pi\int_0^1 (1-y)(1-\sqrt{y})\,dy$$



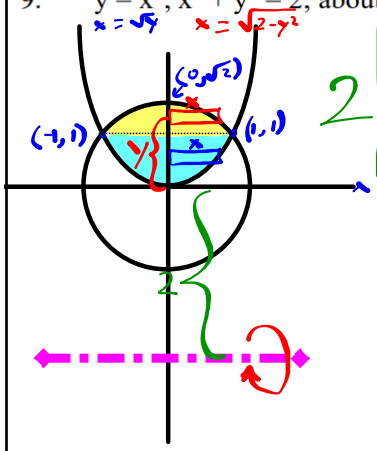
8. $y = x^2$, $x = 1$, $y = 0$; about the line $y = -1$



$2\pi r h$

$$2\pi\int_0^1 (y+1)(1-\sqrt{y})\,dy$$

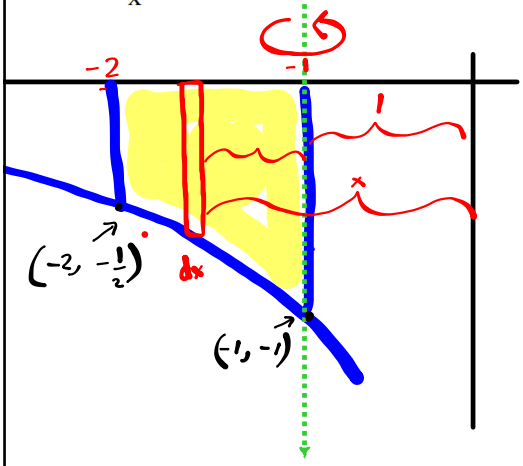
9. $y = x^2$, $x^2 + y^2 = 2$; about the line $y = -2$ [Set this up only.]



$$2\left[2\pi\int_1^{\sqrt{2}}(y+2)(\sqrt{2-y^2})\,dy + 2\pi\int_0^1(y+2)(\sqrt{y})\,dy\right]$$

10. $y = x^2$, $x = 1$, $y = 0$; about the line $x = 1$

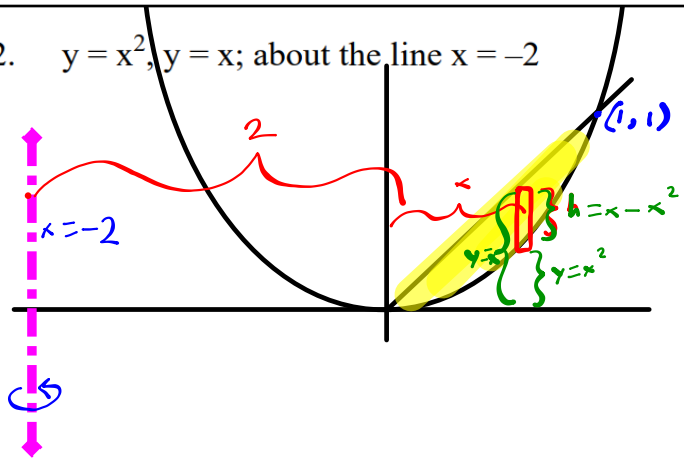
11. $y = \frac{1}{x}$, $x = -2$, $x = -1$, about the line $x = -1$



$2\pi r h \Delta x$

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

12. $y = x^2$, $y = x$; about the line $x = -2$



$$2\pi \int_{0}^{1} (x+2)(x-x^2)\,dx$$