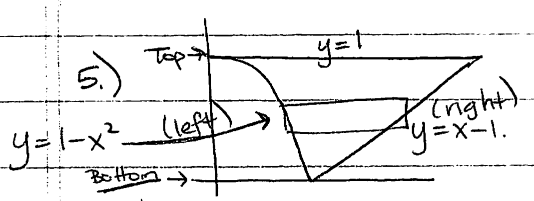
14.10: Selected Homework: 5, 17, 23, 36

5.) 

Let's do right − left, so solve for x:

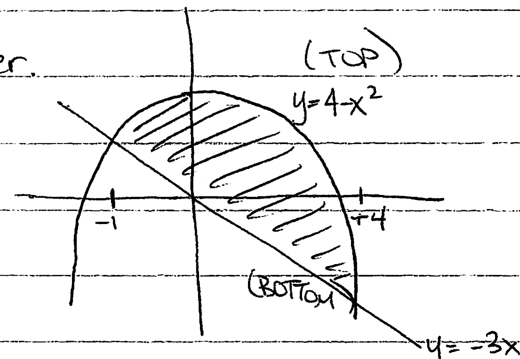
$y = x-1$ $\qquad$ $y = 1-x^2$

$\boxed{x = y+1}$ $\qquad$ $x^2 = 1-y$

$\boxed{x = \sqrt{1-y}}$

$$\int_{\text{Bottom}}^{\text{Top}} \text{Right} - \text{left}\, dy = \int_0^1 (y+1) - (\sqrt{1-y})\, dy$$

17.) Looks like top − bottom is easier.



Set equal: $4 - x^2 = -3x$

$0 = x^2 - 3x - 4$

$0 = (x-4)(x+1)$

$x = +4 \quad x = -1$

$$\int_{-1}^{4} 4 - x^2 - (-3x)\, dx = \int_{-1}^{4} 4 - x^2 + 3x\, dx$$

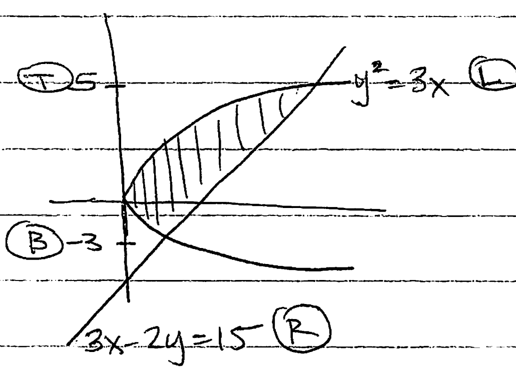
$$= \left[4x - \frac{x^3}{3} + \frac{3}{2}x^2\right]_{-1}^{4} = \left[4(4) - \frac{4^3}{3} + \frac{3}{2}4^2\right] - \left[4(-1) - \frac{(-1)^3}{3} + \frac{3}{2}(-1)^2\right]$$

$$= 20.8\overline{3}$$

23.) $y^2 = 3x$

$3x - 2y = 15$

Let's go R−L and solve for x.



$y^2 = 3x$ $\qquad$ $3x = 15 + 2y$

L $\boxed{x = \frac{y^2}{3}}$ $\qquad$ $\boxed{x = 5 + \frac{2}{3}y}$ R

Solve: $y^2 = 15 + 2y$

$0 = y^2 - 2y - 15$

$0 = (y-5)(y+3)$

$y = 5, \ y = -3$

$$\int_{-3}^{5} 5 + \frac{2}{3}y - \frac{y^2}{3}\, dy = \left[5y + \frac{1}{3}y^2 - \frac{y^3}{9}\right]_{-3}^{5}$$

$$= \left[5 \cdot 5 + \frac{1}{3}5^2 - \frac{5^3}{9}\right] - \left[5 \cdot (-3) + \frac{1}{3}(-3)^2 - \frac{(-3)^3}{9}\right]$$

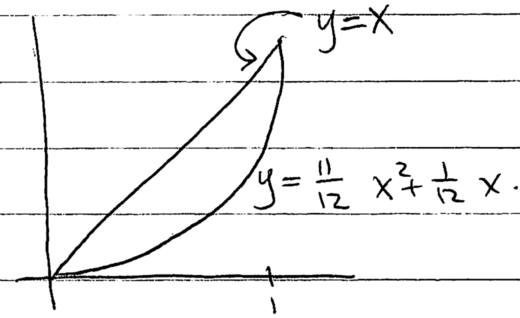
$$= 28.\overline{44}$$

36.)

Area under diagonal: $\frac{1}{2}$.

Area between:

$$\int_0^1 x - \left(\frac{11}{12}x^2 + \frac{1}{12}x\right) dx$$



$$= \int_0^1 -\frac{11}{12}x^2 + \frac{11}{12}x \; dx$$

$$= \frac{-11}{12}\int_0^1 x^2 - x \; dx = \frac{-11}{12}\left[\frac{x^3}{3} - \frac{x^2}{2}\right]_0^1$$

$$= \frac{-11}{12}\left(\frac{1}{3} - \frac{1}{2} - 0\right) = \frac{-11}{12}\left(\frac{-1}{6}\right) = \frac{11}{72}.$$

Coefficient of Inequality $= \dfrac{\frac{11}{72}}{\frac{1}{2}} = \dfrac{11}{36}$.