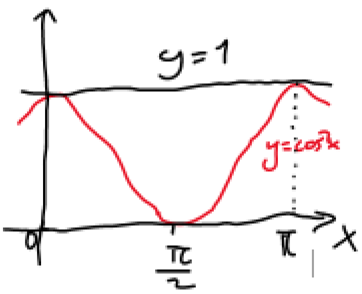
a)



$$\int_0^{\pi} \cos^2(x)\,dx = \frac{1}{2}\int (\cos(2x)+1)\,dx = \frac{1}{2}\int dx + \frac{1}{2}\int \cos(2x)\,dx$$

$$= \frac{x}{2} + \frac{1}{2}\int \cos(2x)\,dx$$

$$= \frac{x}{2} + \frac{1}{2}\left(\frac{1}{2}\int \cos(u)\,du\right)$$

$$= \frac{x}{2} + \frac{\sin(u)}{4}$$

$$= \frac{x}{2} + \frac{1}{4}\sin(2x)$$

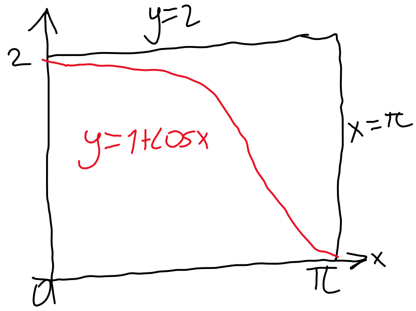
$$\int \cos^2(x)\,dx = \frac{x}{2} + \frac{1}{4}\sin(2x) + C$$

$(x=\pi)$ $= \frac{\pi}{2}$ $\qquad$ $(x=0)$ $= 0$

$$\frac{\pi}{2} - 0 = \frac{\pi}{2}$$

$$\int_0^{\pi} (\cos^2(x))\,dx = \frac{\pi}{2}$$

b)



İntegralin çıkarılacağı dikdörtgenin alanı

$\Downarrow$

$2 \times 2 = 4 \text{ br}^2$

$$\int_0^{\pi} 1+\cos(x)\,dx$$

$$\int 1+\cos(x)\,dx = \left(\int dx + \int \cos(x)\,dx\right) = x + \int \cos(x)\,dx$$

$$= x+\sin(x)$$

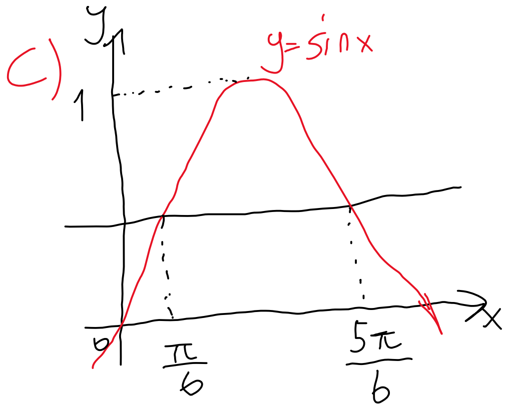
$$= x+\sin(x)+c$$

$(x=\pi)$ $=\pi$ $\qquad$ $(x=0)$ $=0$

$$\int_0^{\pi} 1+\cos(x)\cdot dx = \pi$$

$\text{Area} = 4-\pi \text{ br}^2$

c)



$$\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} \sin(x) \cdot dx$$

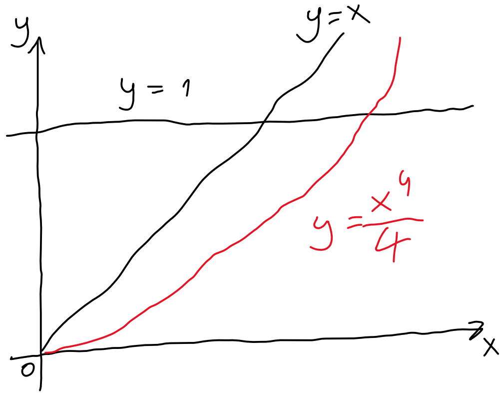
$$\int \sin(x)\, dx = -\cos(x) + C$$

$$\left(x = \frac{5\pi}{6}\right) = \frac{\sqrt{3}}{2} \qquad \left(x = \frac{\pi}{6}\right) = -\frac{\sqrt{3}}{2}$$

$$\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} \sin(x) \cdot dx = \sqrt{3}$$

$$\sqrt{3}\ \text{br}^2$$

d)



Area of triangle: $\frac{1}{2} br^2$

$$\int_0^1 \left(\sqrt{2}\,\sqrt[4]{y}\right) dy$$

$$\int \left(\sqrt{2}\,\sqrt[4]{y}\right) dy = \int 4\sqrt{2}\, u^4\, du$$

$$= \left(4\sqrt{2} \int u^4 du\right) = 4\sqrt{2}\,\frac{u^{7+4}}{7+4} = 4\sqrt{2}\left(\frac{u^5}{5}\right)$$

$$= \frac{4\sqrt{2}}{5}(u)^5 = \frac{4\sqrt{2}}{5}\left(\sqrt[4]{y}\right)^5$$

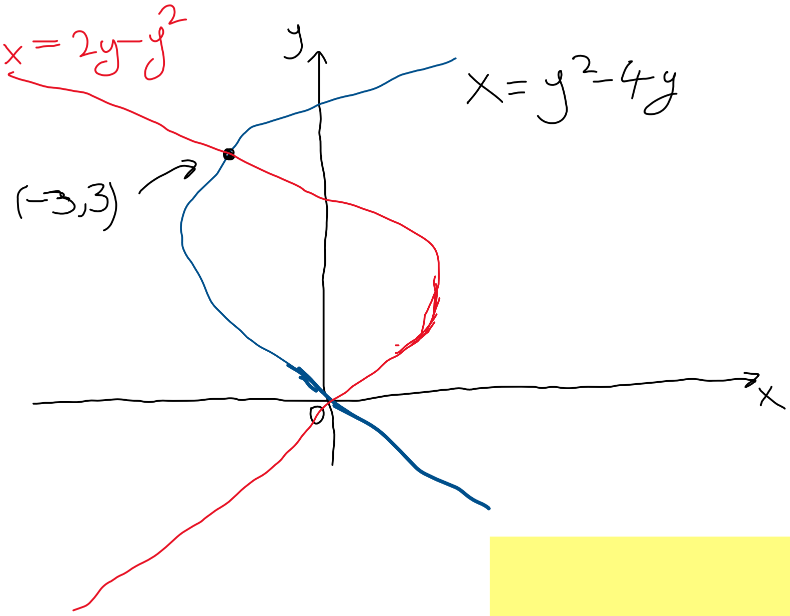
$$\int \sqrt{2}\,\sqrt[4]{y}\,dy = \frac{4}{5}\sqrt{2}\,y^{\frac{5}{4}} + C$$

$$(y=1) = \frac{4\sqrt{2}}{5} \qquad (y=0) = 0$$

$$\int_0^1 \left(\sqrt{2}\,\sqrt[4]{y}\right) dy = \frac{4\sqrt{2}}{5}$$

$$\text{Area} = \frac{4\sqrt{2}}{5} - \frac{1}{2} br^2$$

e)



$$\int_0^3 y^2-4y-2y+y^2$$

$$= \int_0^3 2y^2-6y$$

$$\int (2y^2-6y)\,dy = -\left(6\int y\,dy\right) + \int 2y^2\,dy$$

$$= -6\left(\frac{y^2}{2}\right) + \int 2y^2\,dy$$

$$= -3y^2 + 2\left(\frac{y^3}{3}\right)$$

$$\int (2y^2-6y)\,dy = \frac{y^2}{3}(2y-9) + C$$

$(y=3)$ $= -9$

$(y=0)$ $= 0$

$$\int_0^3 (2y^2-6y)\,dy = -9$$