$with(plots):$

$$\int_0^6 \left(2\cdot x - \left(x^2 - 4\cdot x\right)\right) \mathrm{d}x$$

$$36 \tag{1}$$

$$\int_0^{12} \left(2 + \mathrm{sqrt}(y+4) - \frac{y}{2}\right) \mathrm{d}y + \int_{-4}^{0} \left(2 + \mathrm{sqrt}(4+y) - \left(2 - \mathrm{sqrt}(y+4)\right)\right) \mathrm{d}y$$

$$36 \tag{2}$$

$$2 + \mathrm{sqrt}(4+y) - \left(2 - \mathrm{sqrt}(y+4)\right)$$

$$2\sqrt{y+4} \tag{3}$$

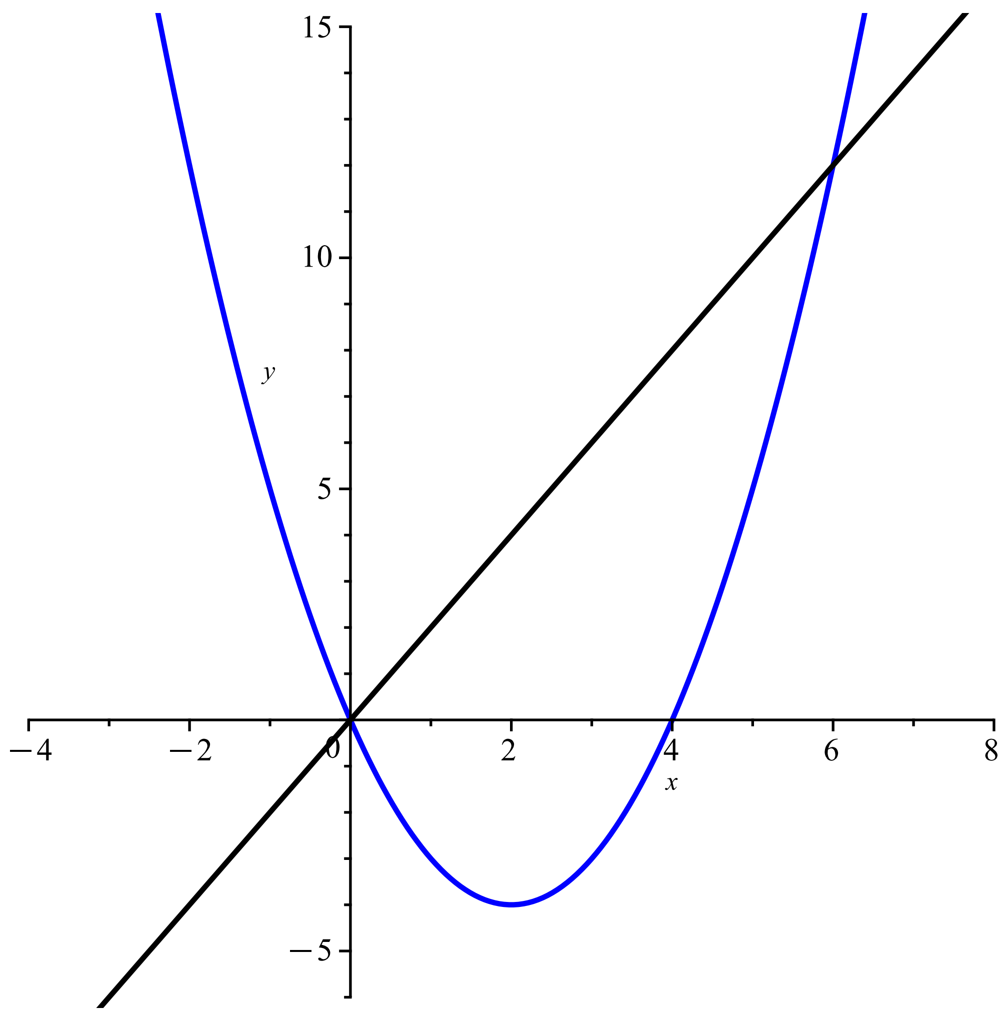
$$f := x \rightarrow x^2 - 4\cdot x$$

$$f := x \mapsto x^2 - 4\cdot x \tag{4}$$

$$g := x \rightarrow 2\cdot x$$

$$g := x \mapsto 2\cdot x \tag{5}$$

$plot([f(x), g(x)], x = -4..8, y = -6..15, thickness = 2, color = [blue, black])$



Finally got this sucker!

$$\int_{-4}^{-3} 2 \cdot \mathrm{sqrt}(x+4)\, \mathrm{d}x + \int_{-3}^{0} (\mathrm{sqrt}(1-x) + \mathrm{sqrt}(x+4) - 1)\, \mathrm{d}x + \int_{0}^{1} 2 \cdot \mathrm{sqrt}(1-x)\, \mathrm{d}x$$

$$9 \tag{6}$$

$$\int_{0}^{3} \left(-2 \cdot y^2 + 6 \cdot y\right) \mathrm{d}y$$

$$9 \tag{7}$$