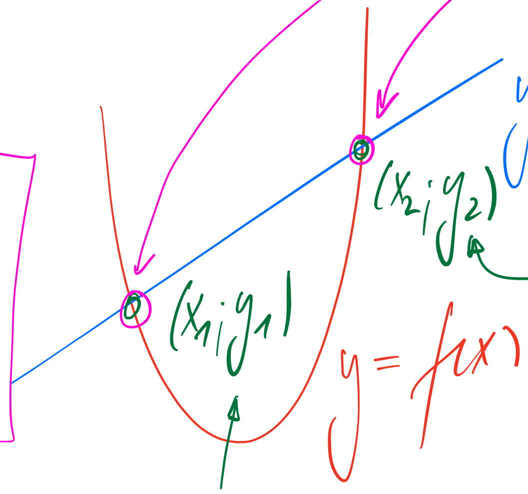
$f(x) = x^2+x-4$

$g(x) = 2x+2$

Intersections de graphes

Résoudre

$f(x) = g(x)$



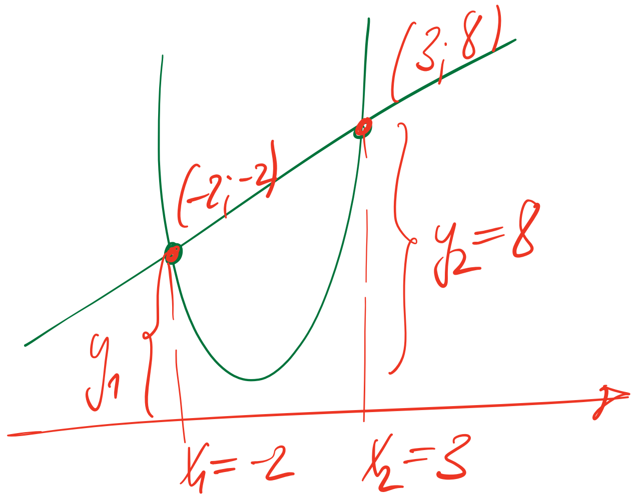
$f(x_2) = g(x_2)$

$f(x_1) = g(x_1)$

$$x^2+x-4 = 2x+2$$

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

$$x^2-x-6 = 0$$



$$\Delta = (-1)^2-4\cdot 1\cdot(-6) = 1+24 = 25$$

$$x = \frac{1\pm\sqrt{25}}{2} = \frac{1\pm 5}{2} \quad \begin{cases} 3 \\ -2 \end{cases}$$

$x_1 = 3 \qquad f(x_1) = f(3) = 3^2 + 3 - 4 = 9+3-4 = 8$

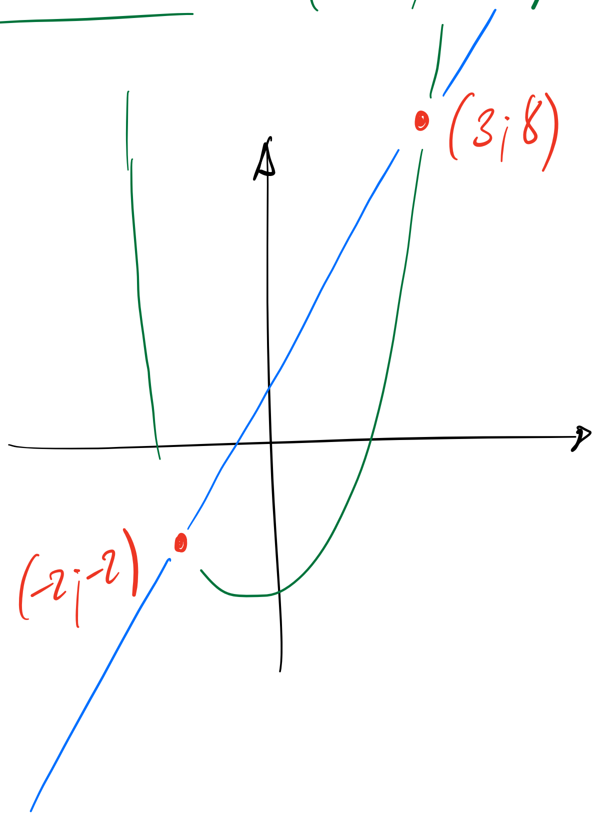
$g(x_1) = g(3) = 2 \cdot 3 + 2 = 8$

1ère intersection : $(3\,;8)$

$x_2 = -2 \qquad f(x_2) = f(-2) = (-2)^2 - 2 - 4 = 4 - 6 = -2$

$g(x_2) = g(-2) = 2 \cdot (-2) + 2 = -2$

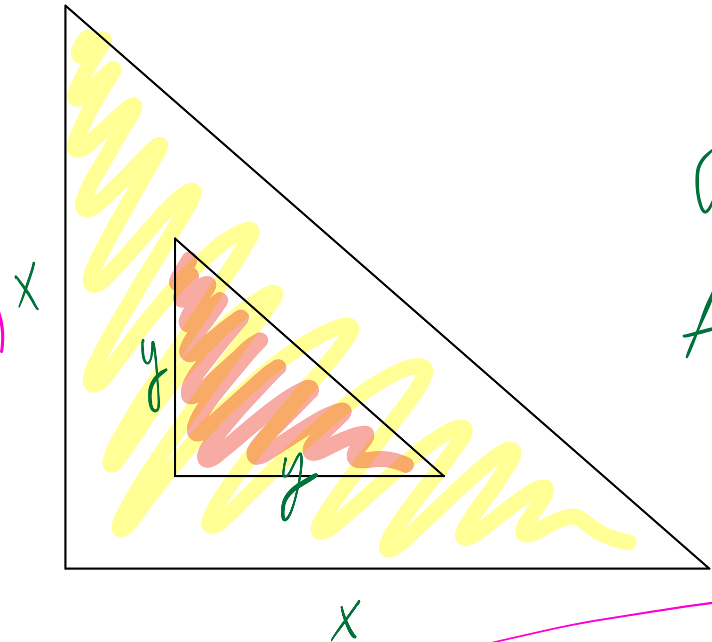
2ème intersection : $(-2\,; -2)$



Bussigny 2024 : question 5

$y = 2x - 15$

$y + 15 = 2x$



$(2x-15)(2x-15)$

$A = \frac{x^2}{2} - \frac{y^2}{2}$

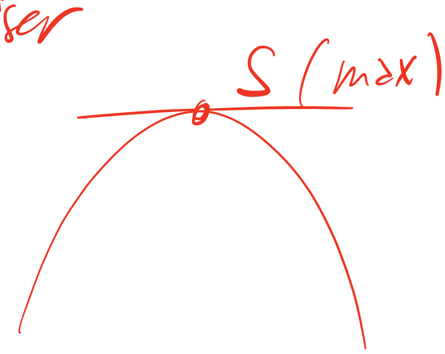
$(A-B)^2 = A^2 - 2AB + B^2$

$(2x-15)^2 = (2x)^2 - 2\cdot 2x \cdot 15 + 15^2$

$$A = \frac{x^2}{2} - \frac{(2x-15)^2}{2} = \frac{1}{2}\left(x^2 - \left(4x^2 - 60x + 225\right)\right)$$

$$= \underbrace{\frac{1}{2}\left(-3x^2 + 60x - 225\right)}_{\text{Sommet ?}}$$

à maximiser



$a < 0$

$$= -\frac{3}{2}x^2 + 30x - \frac{225}{2} = -1{,}5x^2 + 30x - 112{,}5$$

$$S\left(-\frac{b}{2a} ; -\frac{\Delta}{4a}\right)$$

$$\Delta = 30^2 - 4\cdot(-1{,}5)\cdot(-112{,}5)$$

$$= 900 - 3\cdot 225 = 900 - 675$$

$$= 225$$

$$\Rightarrow S\left(\frac{-30}{2\cdot(-1{,}5)} ; -\frac{225}{4\cdot(-1{,}5)}\right)$$

$$S\left(\frac{-30}{-3} ; \frac{225}{6}\right)$$

$$S\left(10 ; \frac{75}{2} = 37{,}5\right)$$

$x = 10 \quad y = 2\cdot 10 - 15 = 5$

Les dimensions cherchées sont $x = 10$ / $y = 5$ (en cm).

L'aire max. vaut $37{,}5\ cm^2$.