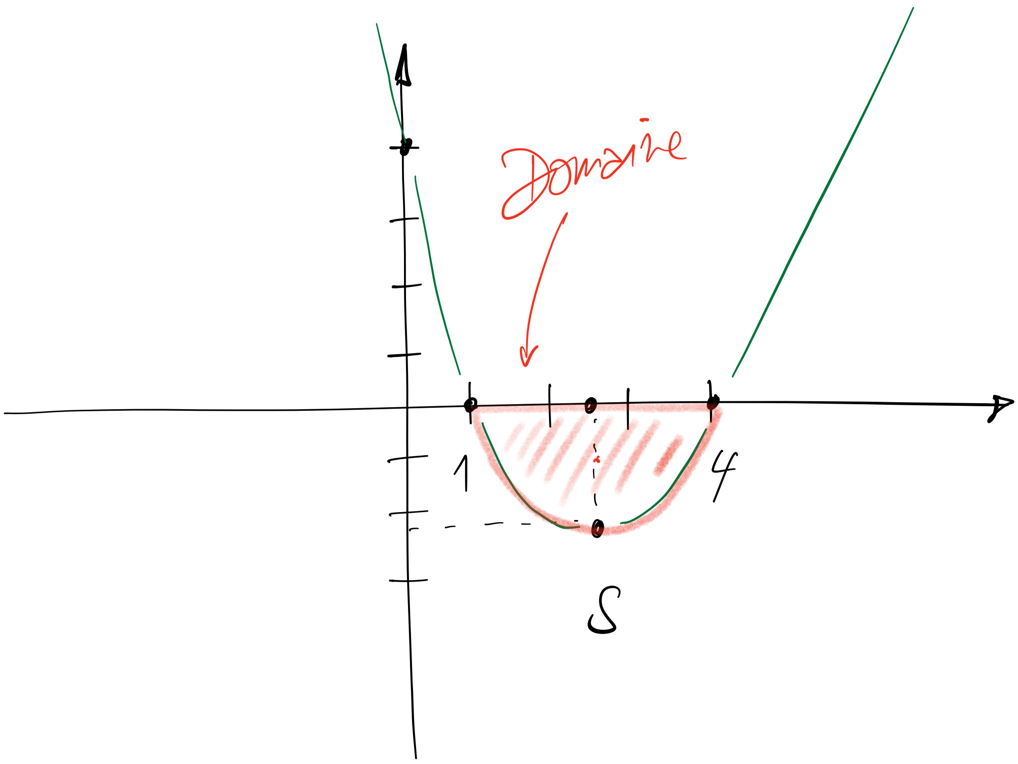
1) $x^2 - 5x + 4$ à étudier $\qquad f(0) = 4$

$(x-1)(x-4) = 0 \qquad x = 1 \quad x = 4 \qquad S = \left(\frac{5}{2} ; f\left(\frac{5}{2}\right)\right)$

$\frac{25}{4} - \frac{25}{2} + 4$

$4 - \frac{25}{4}$

$-\frac{9}{4} = -2{,}25$



$$A = \left| \int_1^4 f(x)\,dx \right| = \left| \left[\left(\frac{1}{3}x^3 - \frac{5}{2}x^2 + 4x \right) \right]_1^4 \right|$$

$$= \left| \left(\frac{64}{3} - \frac{5}{2}16 + 16 \right) - \left(\frac{1}{3} - \frac{5}{2} + 4 \right) \right|$$

$$= \left| \frac{64}{3} - 40 + 16 - \frac{1}{3} + \frac{5}{2} - 4 \right|$$

$$= \left| \frac{63}{3} - 28 + \frac{5}{2} \right| = \left| 21 - 28 + 2{,}5 \right|$$

$$= \left| -7 + 2{,}5 \right| = \left| -4{,}5 \right| = 4{,}5$$

2) $f(x) = x^3 - 2x^2 - x + 2$

Cherchons les zeros de f :

	1	−2	−1	2
1		1	−1	−2
	1	−1	−2	0

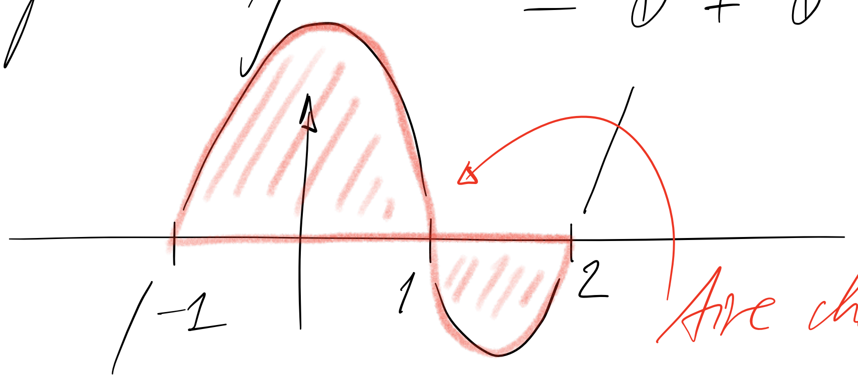
$\Rightarrow f(x) = (x-1)(x^2 - x - 2)$

$x^2 - x - 2 = 0 \Leftrightarrow x = \dfrac{1 \pm \sqrt{1+8}}{2} = \dfrac{1 \pm 3}{2} \begin{cases} 2 \\ -1 \end{cases}$

Ainsi, $f(x) = (x-1)(x+1)(x-2)$

Signe de f :

x		-1		1		2	
$f(x)$	$-$	0	$+$	0	$-$	0	$+$



Aire cherchée

$$A = \underbrace{\int_{-1}^{1} f(x)\,dx}_{A_1} - \underbrace{\int_{1}^{2} f(x)\,dx}_{A_2}$$

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

$$A_1 = \left(\frac{1}{4} - \frac{2}{3} - \frac{1}{2} + 2\right) - \left(\frac{1}{4} + \frac{2}{3} - \frac{1}{2} - 2\right)$$

$$= \frac{13}{12} - \left(-\frac{19}{12}\right) = \frac{32}{12} = \frac{8}{3}$$

$$A_2 = \frac{16}{4} - \frac{2}{3}\cdot 8 - \frac{1}{2}\cdot 4 + 4 - \left(\frac{1}{4} - \frac{2}{3} - \frac{1}{2} + 2\right)$$

$$= 4 - \frac{16}{3} + 2 - \frac{1}{4} + \frac{2}{3} + \frac{1}{2} - 2$$

$$= 4 - \frac{14}{3} + \frac{1}{4} = \frac{48 - 56 + 3}{12} = -\frac{5}{12}$$

$$A = A_1 + A_2 = \frac{32}{12} - \left(-\frac{5}{12}\right) = \frac{37}{12}$$