

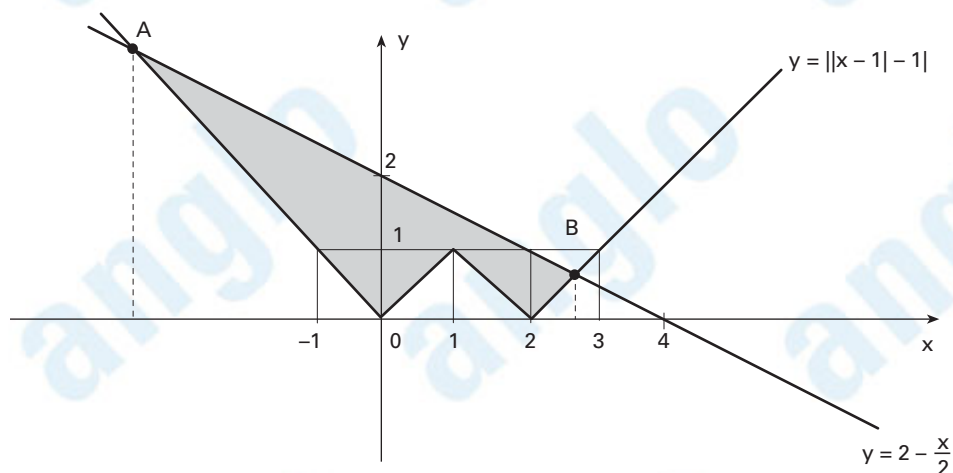
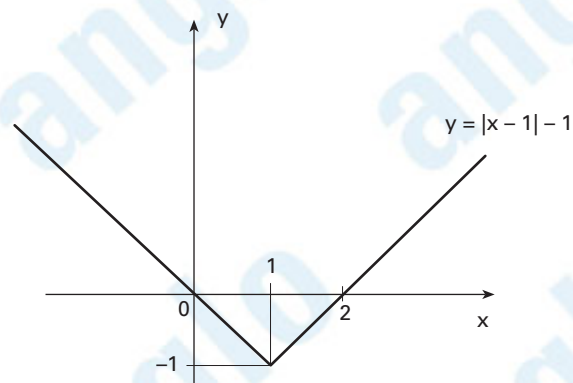
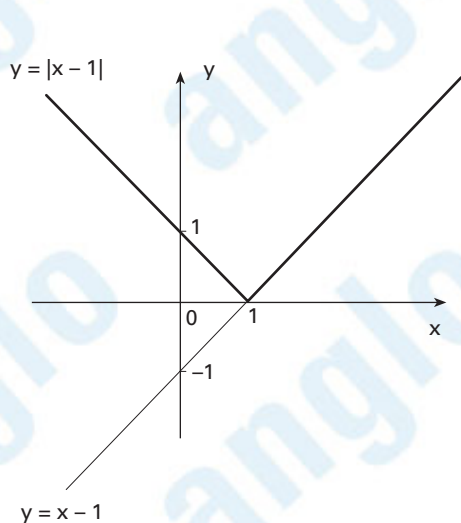
▶ **Questão 7**

Determine a área da região limitada pelas curvas:

$$f(x) = ||x - 1| - 1| \quad \text{e} \quad g(x) = 2 - \frac{x}{2}$$



## Resolução



De  $f(x) = g(x)$ , com  $x < 0$ , temos:

$$|x-1|-1 = 2 - \frac{x}{2}$$

$$|-x+1-1| = 2 - \frac{x}{2}$$

$$|-x| = 2 - \frac{x}{2}$$

$$-x = 2 - \frac{x}{2}$$

$$-\frac{x}{2} = 2$$

$$x = -4 \quad \therefore \text{A abscissa do ponto A é } x_A = -4.$$

De  $f(x) = g(x)$ , com  $2 < x < 3$ , temos:

$$|x-1|-1 = 2 - \frac{x}{2}$$

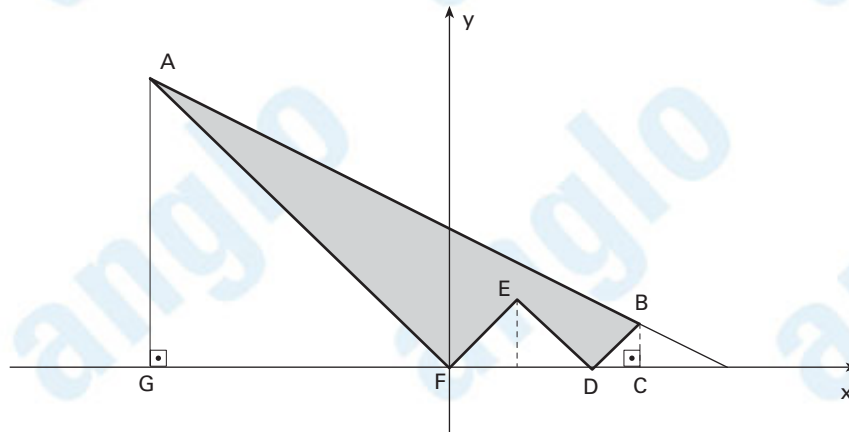
$$|x-1-1| = 2 - \frac{x}{2}$$

$$|x-2| = 2 - \frac{x}{2}$$

$$x - 2 = 2 - \frac{x}{2}$$

$$\frac{3x}{2} = 4$$

$$x = \frac{8}{3} \quad \therefore \text{A abscissa do ponto B é } x_B = \frac{8}{3}.$$



Considerando-se os pontos A, B, C, D, E, F e G, na figura, temos a tabela:

ponto	A	B	C	D	E	F	G
abscissa (x)	-4	$\frac{8}{3}$	$\frac{8}{3}$	2	1	0	-4
ordenada (y)	4	$\frac{2}{3}$	0	0	1	0	0

Sendo:

S a área da região limitada pelas curvas,

$S_{AFG}$  a área do triângulo  $\triangle AFG$ ,

$S_{EDF}$  a área do triângulo  $\triangle EDF$ ,

$S_{BCD}$  a área do triângulo  $\triangle BCD$  e

$S_{ABCG}$  a área do trapézio  $ABCG$ , temos:

$$S = S_{ABCG} - S_{AFG} - S_{EDF} - S_{BCD}$$

$$S = \frac{\left(4 + \frac{2}{3}\right) \cdot \frac{20}{3}}{2} - \frac{1}{2} \cdot 4^2 - \frac{1}{2} \cdot 2 \cdot 1 - \frac{1}{2} \cdot \left(\frac{2}{3}\right)^2$$

$$S = \frac{1}{2} \left[ \frac{14}{3} \cdot \frac{20}{3} - 16 - 2 - \frac{4}{9} \right]$$

$$S = \frac{1}{2} \cdot \frac{114}{9} \quad \therefore S = \frac{19}{3}$$

**Resposta:**  $\frac{19}{3}$