

Exercice : Trouve les zéros et étudie le signe des fonctions suivantes

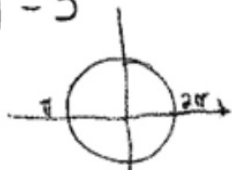
1) $f(x) = \sin(2x + \pi)$

2) $f(x) = -2 \sin \pi(x-1) + 3$

3) $f(x) = 0,5 \sin(x - \frac{\pi}{3})$

4) $f(x) = 10 \sin(\frac{x}{2} + 1) - 5$

1) $0 = \sin(2x + \pi)$

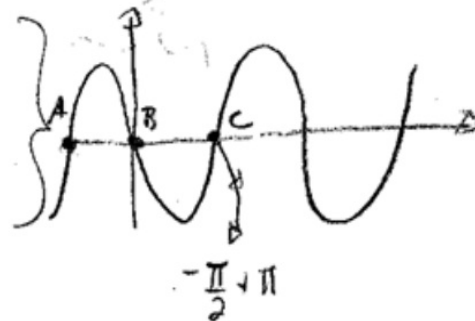


$\Theta_1 = \sin^{-1} 0 = 0$

$2x + \pi = 0$
 $x_1 = -\frac{\pi}{2}$

$\Theta_2 = \pi - 0 = \pi$

$2x + \pi = \pi$
 $2x = 0$
 $x_2 = 0$



$x_1 = -\frac{\pi}{2} + \pi \cdot n$ et $x_2 = \pi \cdot n$

Positive : $[-\frac{\pi}{2} + \pi \cdot n, 0 + \pi \cdot n]$ et Négative $[0 + \pi \cdot n, \frac{\pi}{2} + \pi \cdot n]$

2) $0 = -2 \sin \pi(x-1) + 3 \rightarrow p = \frac{2\pi}{\pi} = 2$

$\frac{3}{2} = \sin \pi(x-1)$

$\Theta = \sin^{-1}(\frac{3}{2}) = \text{impossible}$

Positive sur \mathbb{R}

amplitude 2 et $k = 3$
pas de zéros!

$$3) \Theta = 0,5 \sin\left(x - \frac{\pi}{3}\right) \rightarrow \text{Période} : 2\pi$$

$$0 = \sin\left(x - \frac{\pi}{3}\right)$$

$$\Theta_1 = 2\pi$$

$$x - \frac{\pi}{3} = 2\pi$$

$$x_1 = \frac{7\pi}{3}$$

$$\text{et } \Theta_2 = \pi - 2\pi = -\pi$$

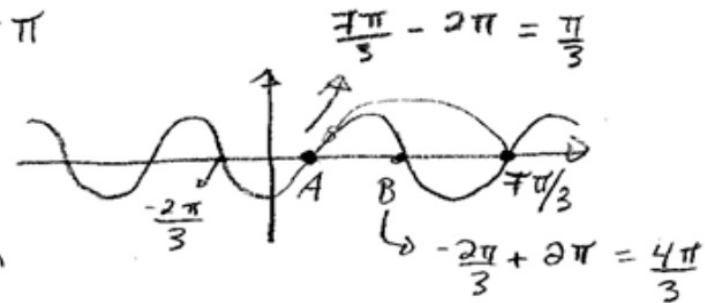
$$x - \frac{\pi}{3} = -\pi$$

$$x_2 = -\frac{2\pi}{3}$$

$$x_1 = \frac{7\pi}{3} + 2\pi \cdot n \quad \text{et} \quad x_2 = -\frac{2\pi}{3} + 2\pi \cdot n$$

$$\text{Négatif} : \left[-\frac{2\pi}{3} + 2\pi \cdot n, \frac{\pi}{3} + 2\pi \cdot n \right] \quad (A)$$

$$\text{Positif} : \left[\frac{\pi}{3} + 2\pi \cdot n, \frac{4\pi}{3} + 2\pi \cdot n \right]$$



$$4) 0 = 10 \sin\left(\frac{x}{2} + 1\right) - 5 \quad \text{période} : \frac{2\pi}{0,5} = 4\pi$$

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

$$\frac{x}{2} + 1 = 0,5236$$

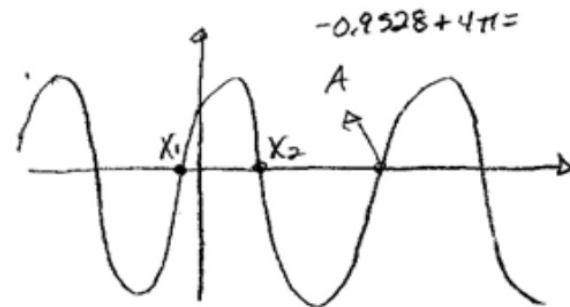
$$x_1 = -0,9528$$

$$\text{et } \frac{x}{2} + 1 = 2,618$$

$$x_2 = 3,236$$

$$\text{Négatif} : [3,236 + 4\pi \cdot n, 11,6136 + 4\pi \cdot n]$$

$$\text{Positif} : [-0,9528 + 4\pi \cdot n, 3,236 + 4\pi \cdot n]$$



$$5) 0 = -2 \sin -\pi \left(\frac{x}{3} + 6 \right) + 1 \quad \rightarrow \text{période : } \sin -\frac{\pi}{3} (x+18)$$

$$\frac{1}{2} = \sin -\pi \left(\frac{x}{3} + 6 \right) \quad \frac{2\pi}{|b|} = \frac{2\pi}{\frac{\pi}{3}} = 6$$

$$\theta = \sin^{-1} \left(\frac{1}{2} \right)$$

$$-\pi \left(\frac{x}{3} + 6 \right) = 0,5236$$

$$x_1 = 3 \left(\frac{0,5236}{-\pi} - 6 \right)$$

$$x_1 = -18,5$$

$$x_1 = -18,5 + 6 \cdot n$$

$$\theta_2 = \pi - 0,5236 = \frac{5\pi}{6}$$

$$\theta_2 = 2,618$$

$$x_2 = 3 \left(\frac{2,618}{-\pi} - 6 \right)$$

$$x_2 = -20,5$$

$$x_2 = -20,5 + 6 \cdot n$$

Négatif : $[-20,5 + 6n, -18,5 + 6n]$

Positif : $[-18,5 + 6n, -14,5 + 6n]$
(A)

