

➤ تمرين 01

| | | | |
|-----|-----------|-----------------|-----------|
| | : | $]-4; +\infty[$ | f |
| x | -4 | -1 | 3 |
| f | $+\infty$ | -2 | 4 |
| | | | $+\infty$ |

(1) $f(]-4; +\infty[)$ $f(]-4; 3])$ $f(]-4; -1])$ $f([-1; +\infty[)$ $f([3; +\infty[)$

(2) $x_B < x_A$ $x_A < x_B$ $B < A$ (Ox) (C_f)

(3) $\lim_{x \rightarrow -4^+} f \circ f(x)$ $\lim_{x \rightarrow +\infty} f \circ f(x)$

➤ تمرين 02

(4) $\lim_{x \rightarrow 1} \frac{\sqrt[3]{x}-1}{\sqrt{x}+\sqrt[4]{x}-2}$ (3) $\lim_{x \rightarrow \frac{\pi}{2}} \frac{1-\sqrt[4]{1+\cos x}}{2x-\pi}$ (2) $\lim_{x \rightarrow 2} \frac{\sqrt[3]{x^2+2x}-2}{\sin(\pi x)}$ (1) $\lim_{x \rightarrow -2} \frac{\sqrt[3]{2-3x}-2}{x+2}$

(6) $\lim_{x \rightarrow +\infty} \sqrt[4]{x^3} (\sqrt[4]{x} - \sqrt[4]{x+2})$ (5) $\lim_{x \rightarrow +\infty} \frac{\sqrt{x} + \sqrt[3]{x} + \sqrt[4]{x}}{\sqrt[5]{x} + \sqrt[6]{x}}$

(3) $\lim_{x \rightarrow -\infty} \arctan\left(\frac{\sqrt{3x}}{\sqrt[3]{1-x^3}}\right)$ (2) $\lim_{x \rightarrow +\infty} x\left(\frac{\pi}{2} - \arctan x\right)$ (1) $\lim_{x \rightarrow \pm\infty} x^2 \arctan\left(\frac{1}{x+1}\right)$

(4) $\lim_{x \rightarrow \pm\infty} x^5 \left(\frac{\pi}{4} - \arctan \frac{x}{x+1}\right)$

➤ تمرين 03

$f(x) = 0$: $f(x) = x + \cos x$: \mathbb{R} f (1)

$r = 10^{-3}$ α

(E) $\sin x - \frac{x}{2} = 0$: \mathbb{R} (2)

(E) $[-2; 2]$ (E) أ

(E) $r = 10^{-3}$ ب

➤ تمرين 04

$a < b$: $b < a$

$f([a; b]) \subset [a; b]$: $[a; b]$ f (1)

$[a; b]$ $f(x) = x$:

$f(b) > b^2$ $f(a) < ab$: $[a; b]$ f (2)

$f(c) = bc$: $[a; b]$ c

➤ تمرين 05

$$: \quad I \quad \alpha \quad (E)$$

$$(4): \begin{cases} (E): \cos x = \frac{2}{3}x \\ I =]\frac{\pi}{6}; \frac{\pi}{3}[\end{cases} \quad (3): \begin{cases} (E): x^3 + \sqrt{x+1} = 0 \\ I =]-\frac{7}{8}; -\frac{3}{4}[\end{cases} \quad (2): \begin{cases} (E): x + \sin x = 1 \\ I =]0; \frac{\pi}{6}[\end{cases} \quad (1): \begin{cases} (E): x^3 + 3x = 5 \\ I =]1; \frac{5}{4}[\end{cases}$$

➤ تمرين 06

$$. f(x) = \frac{x}{\sqrt{2-x}} : \quad f$$

$$. \quad J \quad D_f \quad f \quad D_f \quad - (1)$$

$$. (E): f^{-1}(x) = f(x) : \quad \mathbb{R} \quad \forall x \in J: f^{-1}(x) = \frac{4x}{x + \sqrt{x^2 + 8}} : \quad - (2)$$

➤ تمرين 07

$$. f(x) = \frac{1}{\sqrt{x^3 + 1}} : \quad I =]-1; +\infty[\quad f$$

$$. \lim_{x \rightarrow +\infty} f(x) \quad \lim_{x \rightarrow -1^+} f(x) \quad I \quad f \quad - (1)$$

$$. f \quad f^{-1} \quad J \quad I \quad f \quad - (2)$$

➤ تمرين 08

$$. f(x) = (1+x^3)^2 : \quad \mathbb{R} \quad f$$

$$. J =]-\infty; -1] \quad I = [-1; +\infty[\quad f \quad - (1)$$

$$. f_1^{-1} \quad \mathbb{R}_+ \quad I \quad I \quad f \quad f_1 \quad - (2)$$

$$. f_2^{-1} \quad \mathbb{R}_+ \quad J \quad J \quad f \quad f_2 \quad - (3)$$

➤ تمرين 09

$$: \quad \mathbb{R}$$

$$(E_2): 2 \arctan x = \arctan\left(\frac{2x}{1-x^2}\right) \quad (E_1): \arctan x + \arctan(2x) = \frac{\pi}{4}$$

$$. (E_3): \arctan\left(\frac{1-x^2}{2x}\right) + 2 \arctan x = \frac{\pi}{2}$$

➤ تمرين 10

$$. f(x) = \frac{\cos x - \sin x}{\sin x} : \quad f$$

$$. \forall x \in D_f: f'(x) = \frac{-1}{\sin^2 x} : \quad D_f \quad - (1)$$

$$. f_0^{-1} \quad \mathbb{R} \quad I_0 \quad I_0 =]0; \pi[\quad f \quad f_0 \quad - (2)$$

$$. I_k =]k\pi; (k+1)\pi[\quad f \quad f_k \quad \mathbb{Z}^* \quad k \quad - (3)$$

$$. f_k^{-1} \quad \mathbb{R} \quad I_k \quad f_k$$

➤ تمرين 11

| | | | |
|------|---|------|---|
| | J | I | f |
| (4): | $\left\{ \begin{array}{l} f(x) = x - \sqrt{4-x^2} \\ I = [-\sqrt{2}; 2] \end{array} \right.$ | (3): | $\left\{ \begin{array}{l} f(x) = 1 + \sqrt{1+x^2} \\ I =]-\infty; 0] \end{array} \right.$ |
| | | (2): | $\left\{ \begin{array}{l} f(x) = x - 4\sqrt{x} \\ I = [4; +\infty[\end{array} \right.$ |
| | | (1): | $\left\{ \begin{array}{l} f(x) = \frac{x^2}{x+1} \\ I =]-1; 0] \end{array} \right.$ |
| (7): | $\left\{ \begin{array}{l} f(x) = \begin{cases} x^2 + 2x; & 0 \leq x \leq 1 \\ -2x; & x < 0 \end{cases} \\ I =]-\infty; 1] \end{array} \right.$ | (6): | $\left\{ \begin{array}{l} f(x) = \tan x \\ I_k = \left] -\frac{\pi}{2} + k\pi; \frac{\pi}{2} + k\pi \right[; k \in \mathbb{Z}^* \end{array} \right.$ |
| | | (5): | $\left\{ \begin{array}{l} f(x) = \frac{2x}{1+ x } \\ I = \mathbb{R} \end{array} \right.$ |

➤ تمرين 12

• $f(x) = \arctan(\tan 2x) : f$

• $D_f = \bigcup_{k \in \mathbb{Z}} \left] -\frac{\pi}{4} + k\frac{\pi}{2}; \frac{\pi}{4} + k\frac{\pi}{2} \right[: \quad - (1)$

• $T = \frac{\pi}{2} \quad f \quad - (2)$

• $I_k = \left] -\frac{\pi}{4} + k\frac{\pi}{2}; \frac{\pi}{4} + k\frac{\pi}{2} \right[\quad \mathbb{Z} \quad k \quad - (3)$

• $\forall x \in I_k : f(x) = 2x - k\pi : \quad \forall x \in I_0 : f(x) = 2x :$

➤ تمرين 13

• $f(x) = \tan^2 x - 2\sqrt{3} \tan x : f$

• $\mathbb{Z} \quad k \quad D_k = \left] -\frac{\pi}{2} + k\pi; \frac{\pi}{2} + k\pi \right[\quad f \quad D_f \quad - (1)$

f_k^{-1} J I_k $I_k = \left] -\frac{\pi}{2} + k\pi; \frac{\pi}{3} + k\pi \right[\quad f \quad f_k \quad - (2)$

• f_k

g_k^{-1} K I_k $J_k = \left[\frac{\pi}{3} + k\pi; \frac{\pi}{2} + k\pi \right[\quad f \quad g_k \quad - (3)$

• g_k

➤ تمرين 14

• $f(x) = \sin\left(\frac{1}{x}\right) : \quad \mathbb{R}^* \quad f \quad - (1)$

• $f(x) = \begin{cases} 1; & x \in \mathbb{Q} \\ 0; & x \in \mathbb{R} \setminus \mathbb{Q} \end{cases} : \quad \mathbb{R} \quad f \quad - (2)$

• $\mathbb{R} \quad f \circ f \quad \mathbb{R} \quad f \quad - (3)$

• $\forall (x; y) \in \mathbb{R}^2 : f(x+y) = f(x) + f(y)$