

1. Considera a função f definida em \mathbb{R} por $f(x) = 1 - 2 \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right)$.

1.1. Determina o contradomínio da função f .

Com o domínio da função \sin $[-1, 1]$

$$-1 \leq \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right) \leq 1 \Leftrightarrow$$

$$\Leftrightarrow -2 \leq 2 \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right) \leq 2$$

$$\Leftrightarrow 2 \geq -2 \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right) \geq -2$$

$$\Leftrightarrow -2 \leq -2 \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right) \leq 2$$

$$\Leftrightarrow 1-2 \leq 1-2 \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right) \leq 2+1$$

$$\Leftrightarrow -1 \leq 1-2 \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right) \leq 3$$

$$\text{Logo } D_f = [-1, 3]$$

1.2. Escreve a expressão geral dos zeros de f .

$$f(x) = 0 \Leftrightarrow 1 - 2 \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right) = 0$$

$$\Leftrightarrow -2 \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right) = -1$$

$$\Leftrightarrow \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right) = \frac{1}{2}$$

$$\Leftrightarrow \sin\left(\frac{\pi}{5} + \frac{2}{3}x\right) = \sin\left(\frac{\pi}{6}\right)$$

$$\Leftrightarrow \frac{\pi}{5} + \frac{2}{3}x = \frac{\pi}{6} + 2k\pi \vee \frac{\pi}{5} + \frac{2}{3}x = \pi - \frac{\pi}{6} + 2k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow \frac{2}{3}x = -\frac{\pi}{30} + 2k\pi \vee \frac{2}{3}x = \frac{14}{30}\pi + 2k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow x = -\frac{\pi}{20} + 3k\pi \vee x = \frac{14}{20}\pi + 3k\pi, k \in \mathbb{Z}$$

1.3. Prova que f é periódica de período 3π .

$$\begin{aligned}
 f(x + 3\pi) &= 1 - 2 \sin\left(\frac{\pi}{3} + \frac{2}{3}(x + 3\pi)\right) = \\
 &= 1 - 2 \sin\left(\frac{\pi}{3} + \frac{2}{3}x + 2\pi\right) = \\
 &= 1 - 2 \sin\left(\frac{\pi}{3} + \frac{2}{3}x\right) = f(x) \\
 \text{Logo período é } 3\pi
 \end{aligned}$$

2. Considera as funções f, g, h, i, j, k e l definidas, respetivamente, por:

$$\begin{aligned}
 f(x) &= 5 + 3 \sin x & g(x) &= 1 - \sin 2x & h(x) &= 3 - 6 \cos \frac{1}{2}x & i(x) &= \frac{2}{3 + \cos x} \\
 j(x) &= 2 \tan\left(x + \frac{\pi}{3}\right) & k(x) &= 1 + \tan\left(5x + \frac{\pi}{6}\right) & l(x) &= 3 - 4 \cos^2\left(2x + \frac{\pi}{4}\right)
 \end{aligned}$$

2.1. Determina o domínio e o contradomínio de cada uma das funções.

$f(x)$ $D_f = \mathbb{R}$

$$\begin{aligned}
 -1 &\leq \sin x \leq 1 \\
 -3 &\leq 3 \sin x \leq 3 \\
 5 - 3 &\leq 5 + 3 \sin x \leq 5 + 3 \\
 2 &\leq f(x) \leq 8 \\
 D'_f &= [2, 8]
 \end{aligned}$$

$g(x)$ $D_g = \mathbb{R}$

$$\begin{aligned}
 -1 &\leq \sin(2x) \leq 1 \\
 1 &\geq -\sin(2x) \geq -1 \\
 -1 &\leq -\sin(2x) \leq 1
 \end{aligned}$$

$\rightarrow 1 - 1 \leq g(x) \leq 1 + 1$
 $0 \leq g(x) \leq 2$
 $D'_g = [0, 2]$

h(x) $D_h = \mathbb{R}$

$$-1 \leq \cos\left(\frac{1}{2}x\right) \leq 1$$

$$-6 \leq 6\cos\left(\frac{1}{2}x\right) \leq 6$$

$$6 \geq -6\cos\left(\frac{1}{2}x\right) \geq -6$$

$$-6 \leq -6\cos\left(\frac{1}{2}x\right) \leq 6$$

$$3-6 \leq 3-6\cos\left(\frac{1}{2}x\right) \leq 6+3$$

$$-3 \leq h(x) \leq 9$$

$$D'_h = [-3, 9]$$

i(x)

$$3 + \cos x \neq 0$$

$$\cos x \neq -3, \forall x \in \mathbb{R}$$

logo $D_i = \mathbb{R}$

$$-1 \leq \cos x \leq 1$$

$$2 \leq 3 + \cos x \leq 4$$

$$\frac{1}{2} \geq \frac{1}{3 + \cos x} \geq \frac{1}{4}$$

$$\frac{1}{4} \leq \frac{1}{3 + \cos x} \leq \frac{1}{2}$$

$$\frac{1}{2} \leq \frac{2}{3 + \cos x} \leq 1$$

$$D'_i = \left[\frac{1}{2}, 1\right]$$

$$\underline{g(x)} \quad D_g = \left\{ x \in \mathbb{R} : x + \frac{\pi}{3} \neq \frac{\pi}{2} + k\pi, k \in \mathbb{Z} \right\}$$

$$x + \frac{\pi}{3} = \frac{\pi}{2} + k\pi, k \in \mathbb{Z}$$

$$x = \frac{\pi}{2} - \frac{\pi}{3} + k\pi, k \in \mathbb{Z}$$

$$x = \frac{\pi}{6} + k\pi, k \in \mathbb{Z}$$

logo

$$D_g = \left\{ x \in \mathbb{R} : x \neq \frac{\pi}{6} + k\pi, k \in \mathbb{Z} \right\}$$

$$D'_g = \mathbb{R}$$

$$\underline{k(x)} \quad D_k = \left\{ x \in \mathbb{R} : 5x + \frac{\pi}{6} \neq \frac{\pi}{2} + k\pi, k \in \mathbb{Z} \right\}$$

$$5x + \frac{\pi}{6} = \frac{\pi}{2} + k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow 5x = \frac{\pi}{2} - \frac{\pi}{6} + k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow 5x = \frac{\pi}{3} + k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow x = \frac{\pi}{15} + k\frac{\pi}{5}, k \in \mathbb{Z}$$

logo

$$D_k = \left\{ x \in \mathbb{R} : x \neq \frac{\pi}{15} + k\frac{\pi}{5}, k \in \mathbb{Z} \right\}$$

$$D'_k = \mathbb{R}$$

$L(x)$ $D_1 = \mathbb{R}$

$$0 \leq \cos^2\left(2x + \frac{\pi}{4}\right) \leq 1$$

$$0 \leq 4 \cos^2\left(2x + \frac{\pi}{4}\right) \leq 4$$

$$-4 \leq -4 \cos^2\left(2x + \frac{\pi}{4}\right) \leq 0$$

$$3 - 4 \leq 3 - 4 \cos^2\left(2x + \frac{\pi}{4}\right) \leq 3$$

$$-1 \leq L(x) \leq 3$$

$$D_1' = [-1, 3]$$

Nota
 $-1 \leq \cos x \leq 1$
 $0 \leq \cos^2 x \leq 1$

2.2. Determina, caso existam, uma expressão geral dos zeros de cada uma das funções.

$f(x)$ como $D_1' = [2, 8]$, a função não tem zeros.

$g(x)$

$$g(x) = 0 \Leftrightarrow 1 - \sin(2x) = 0 \Leftrightarrow$$

$$\Leftrightarrow \sin(2x) = 1$$

$$\Leftrightarrow \sin(2x) = \sin\left(\frac{\pi}{2}\right)$$

$$\Leftrightarrow 2x = \frac{\pi}{2} + 2k\pi, \quad k \in \mathbb{Z}$$

$$\Leftrightarrow x = \frac{\pi}{4} + k\pi, \quad k \in \mathbb{Z}$$

$$\underline{h(x)} = 0 \Leftrightarrow 3 - 6 \cos\left(\frac{1}{2}x\right) = 0$$

$$\Leftrightarrow \cos\left(\frac{1}{2}x\right) = \frac{1}{2}$$

$$\Leftrightarrow \cos\left(\frac{1}{2}x\right) = \cos\left(\frac{\pi}{3}\right)$$

$$\Leftrightarrow \frac{1}{2}x = \frac{\pi}{3} + 2k\pi \vee \frac{1}{2}x = -\frac{\pi}{3} + 2k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow x = \frac{2\pi}{3} + 4k\pi \vee x = -\frac{2\pi}{3} + 4k\pi, k \in \mathbb{Z}$$

$\hat{h}(x)$ como $D_{\hat{h}} = \left[\frac{\pi}{2}, 1\right]$ então $\hat{h}(x)$ não tem zeros.

$$\underline{g(x)} = 0 \Leftrightarrow 2 \tan\left(x + \frac{\pi}{3}\right) = 0 \Leftrightarrow$$

$$\Leftrightarrow \tan\left(x + \frac{\pi}{3}\right) = 0$$

$$\Leftrightarrow \tan\left(x + \frac{\pi}{3}\right) = \tan 0$$

$$\Leftrightarrow x + \frac{\pi}{3} = k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow x = -\frac{\pi}{3} + k\pi, k \in \mathbb{Z}$$

$$\underline{r(x)} = 0 \Leftrightarrow 1 + 2 \tan\left(5x + \frac{\pi}{6}\right) = 0$$

$$\Leftrightarrow \tan\left(5x + \frac{\pi}{6}\right) = -1$$

$$\Leftrightarrow \tan\left(5x + \frac{\pi}{6}\right) = \tan\left(\frac{3\pi}{4}\right)$$

$$\Leftrightarrow 5x + \frac{\pi}{6} = \frac{3\pi}{4} + k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow x = \frac{\pi}{60} + \frac{k\pi}{5}, k \in \mathbb{Z}$$

$$\underline{l(x)} = 0 \Leftrightarrow 3 - 4 \cos^2\left(2x + \frac{\pi}{4}\right) = 0$$

$$\Leftrightarrow \cos^2\left(2x + \frac{\pi}{4}\right) = \frac{3}{4}$$

$$\Leftrightarrow \cos\left(2x + \frac{\pi}{4}\right) = \pm\sqrt{\frac{3}{4}}$$

$$\Leftrightarrow \cos\left(2x + \frac{\pi}{4}\right) = \frac{\sqrt{3}}{2} \vee \cos\left(2x + \frac{\pi}{4}\right) = -\frac{\sqrt{3}}{2}$$

$$\Leftrightarrow \cos\left(2x + \frac{\pi}{4}\right) = \cos\left(\frac{\pi}{6}\right) \vee \cos\left(2x + \frac{\pi}{4}\right) = \cos\left(-\frac{\pi}{6}\right)$$

$$\Leftrightarrow 2x + \frac{\pi}{4} = \frac{\pi}{6} + 2k\pi \vee 2x + \frac{\pi}{4} = -\frac{\pi}{6} + 2k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow x = -\frac{\pi}{24k} + k\pi \vee x = -\frac{5\pi}{24k} + k\pi, k \in \mathbb{Z}$$

2.3. Estuda, quanto à paridade, as funções f , g , h e i .

$f(x)$

$D_f = \mathbb{R}$

$$f(-x) = 5 + 3 \sin(-x) = 5 - 3 \sin(x)$$

Logo f não é par nem ímpar

$g(x)$

$D_g = \mathbb{R}$

$$g(-x) = 1 - \sin(-2x) = 1 + \sin(2x)$$

Assim $g(-x) \neq g(x)$ e

$$g(-x) \neq -g(x)$$

Logo g não é par nem ímpar

$h(x)$ $D_h = \mathbb{R}$

$$h(-x) = 3 - 6 \cos\left(-\frac{1}{2}x\right) =$$

$$= 3 - 6 \cos\left(\frac{1}{2}x\right) = h(x)$$

Logo h é par

$i(x)$ $D_i = \mathbb{R}$

$$i(-x) = \frac{2}{3 + \cos(-x)} = \frac{2}{3 + \cos x} = i(x)$$

Logo i é par

2.4. Escreva uma expressão geral dos maximizantes das funções g , i e l .

$g(x)$ $D'_g = \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

$$g(x) = 2 \Leftrightarrow 1 - \sin(2x) = 2$$

$$\Leftrightarrow \sin(2x) = -1$$

$$\Leftrightarrow \sin(2x) = \sin\left(-\frac{\pi}{2}\right)$$

$$\Leftrightarrow 2x = -\frac{\pi}{2} + 2k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow x = -\frac{\pi}{4} + k\pi, k \in \mathbb{Z}$$

$$j(x) \quad D'_j = \left[-\frac{\pi}{2}, \pi\right]$$

$$j(x) = 1 \Leftrightarrow \frac{2}{3 + \cos x} = 1 \Leftrightarrow$$

$$\Leftrightarrow 3 + \cos x = 2$$

$$\Leftrightarrow \cos x = -1$$

$$\Leftrightarrow x = -\pi + 2k\pi, \quad k \in \mathbb{Z}$$

$$\underline{l(x)} \quad D'_l = [-\pi, \pi]$$

$$l(x) = 3 \Leftrightarrow 3 - 4 \cos^2\left(x + \frac{\pi}{4}\right) = 3$$

$$\Leftrightarrow -4 \cos^2\left(x + \frac{\pi}{4}\right) = 0$$

$$\Leftrightarrow \cos^2\left(x + \frac{\pi}{4}\right) = 0$$

$$\Leftrightarrow \cos\left(x + \frac{\pi}{4}\right) = 0$$

$$\Leftrightarrow \cos\left(x + \frac{\pi}{4}\right) = \cos\left(\frac{\pi}{2}\right)$$

$$\Leftrightarrow x + \frac{\pi}{4} = \frac{\pi}{2} + k\pi, \quad k \in \mathbb{Z}$$

$$\Leftrightarrow x = \frac{\pi}{4} + \frac{k\pi}{2}, \quad k \in \mathbb{Z}$$

2.5. Escreve uma expressão geral dos minimizantes das funções f , h e i .

$$\underline{4(x)} \quad D'_4 = [\pi, 2\pi]$$

$$4(x) = 2 \Leftrightarrow 3 + 3 \sin x = 2 \Leftrightarrow \sin x = -1$$

$$\Leftrightarrow x = -\frac{\pi}{2} + 2k\pi, \quad k \in \mathbb{Z}$$

$$\underline{h(x)} \quad D'_h = [-9, 9]$$

$$h(x) = -3 \Leftrightarrow 3 - 6 \cos\left(\frac{1}{2}x\right) = -3$$

$$\Leftrightarrow \cos\left(\frac{1}{2}x\right) = 1$$

$$\Leftrightarrow \frac{1}{2}x = 2k\pi, \quad k \in \mathbb{Z}$$

$$\Leftrightarrow x = 4k\pi, \quad k \in \mathbb{Z}$$

$$\underline{l(x)} \quad D'_l = [-1, 3]$$

$$l(x) = -1 \Leftrightarrow 3 - 4 \cos^2\left(2x + \frac{\pi}{4}\right) = -1$$

$$\Leftrightarrow \cos^2\left(2x + \frac{\pi}{4}\right) = 1$$

$$\Leftrightarrow \cos\left(2x + \frac{\pi}{4}\right) = 1 \vee \cos\left(2x + \frac{\pi}{4}\right) = -1$$

$$\Leftrightarrow 2x + \frac{\pi}{4} = k\pi, \quad k \in \mathbb{Z}$$

$$\Leftrightarrow 2x = -\frac{\pi}{4} + k\pi, \quad k \in \mathbb{Z}$$

$$\Leftrightarrow x = -\frac{\pi}{8} + \frac{k\pi}{2}, \quad k \in \mathbb{Z}$$

2.6. Prova que:

2.6.1. g é periódica de período π .

$$\begin{aligned} g(x+\pi) &= 1 - \operatorname{sen}(2(x+\pi)) = 1 - \operatorname{sen}(2x+2\pi) \\ &= 1 - \operatorname{sen}(2x) = g(x) \end{aligned}$$

g tem período π

2.6.2. h é periódica de período 4π .

$$\begin{aligned} h(x+4\pi) &= 3 + 6 \cos\left(\frac{1}{2}(x+4\pi)\right) = \\ &= 3 + 6 \cos\left(\frac{1}{2}x + 2\pi\right) = \\ &= 3 + 6 \cos\left(\frac{1}{2}x\right) = h(x) \end{aligned}$$

h tem período 4π

2.6.3. k é periódica de período $\frac{\pi}{5}$.

$$\begin{aligned} k\left(x+\frac{\pi}{5}\right) &= 1 + \tan\left(5\left(x+\frac{\pi}{5}\right) + \frac{\pi}{6}\right) = \\ &= 1 + \tan\left(5x + \pi + \frac{\pi}{6}\right) = \\ &= 1 + \tan\left(5x + \frac{\pi}{6} + \pi\right) = \\ &= 1 + \tan\left(5x + \frac{\pi}{6}\right) = k(x) \end{aligned}$$

k tem período $\frac{\pi}{5}$

3. Determina, caso existam, os valores de $x \in [-\pi, \pi[$ tais que:

3.1. $\cos^2 x = \frac{1}{4}$

$$\cos^2 x = \frac{1}{4} \Leftrightarrow \cos x = \frac{1}{2} \vee \cos x = -\frac{1}{2}$$

$$\Leftrightarrow x = \frac{\pi}{3} + 2k\pi \vee x = -\frac{\pi}{3} + 2k\pi \vee$$

$$\vee x = \frac{2\pi}{3} + 2k\pi \vee x = -\frac{2\pi}{3} + 2k\pi, k \in \mathbb{Z}$$

Como $x \in [-\pi, \pi[$, tem-se que

$$\text{C.S.} = \left\{ \frac{\pi}{3}, -\frac{\pi}{3}, \frac{2\pi}{3}, -\frac{2\pi}{3} \right\}.$$

3.2. $2 \sin 2x = -1$

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

$$\Leftrightarrow 2x = -\frac{\pi}{6} + 2k\pi \vee 2x = \pi + \frac{\pi}{6} + 2k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow x = -\frac{\pi}{12} + k\pi \vee x = \frac{7\pi}{12} + k\pi, k \in \mathbb{Z}$$

Se $k = 0$, vem que $x = -\frac{\pi}{12} \in [-\pi, \pi[$

ou $x = \frac{7\pi}{12} \in [-\pi, \pi[$.

Se $k = 1$, vem que $x = \frac{11\pi}{12} \in [-\pi, \pi[$

ou $x = \frac{19\pi}{12} \notin [-\pi, \pi[$.

Se $k = -1$, vem que $x = -\frac{13\pi}{12} \notin [-\pi, \pi[$

ou $x = -\frac{5\pi}{12} \in [-\pi, \pi[$.

Assim, C.S. = $\left\{ -\frac{\pi}{12}, \frac{7\pi}{12}, \frac{11\pi}{12}, -\frac{5\pi}{12} \right\}$.

3.3. $3 \tan\left(x + \frac{\pi}{3}\right) = 3$

$$3 \operatorname{tg}\left(x + \frac{\pi}{3}\right) = 3$$

$$\Leftrightarrow \operatorname{tg}\left(x + \frac{\pi}{3}\right) = 1$$

$$\Leftrightarrow x + \frac{\pi}{3} = \frac{\pi}{4} + k\pi, k \in \mathbb{Z}$$

$$\Leftrightarrow x = -\frac{\pi}{12} + k\pi, k \in \mathbb{Z}$$

Se $k = 0$, vem que $x = -\frac{\pi}{12} \in [-\pi, \pi]$.

Se $k = 1$, vem que $x = \frac{11\pi}{12} \in [-\pi, \pi]$.

Assim, C.S. = $\left\{-\frac{\pi}{12}, \frac{11\pi}{12}\right\}$.

3.4. $\sin x (1 - 2 \cos x) = 0$

$$\operatorname{sen} x (1 - 2 \cos x) = 0$$

$$\Leftrightarrow \operatorname{sen} x = 0 \vee 1 - 2 \cos x = 0$$

$$\Leftrightarrow \operatorname{sen} x = 0 \vee \cos x = \frac{1}{2}$$

$$\Leftrightarrow x = k\pi \vee x = \frac{\pi}{3} + 2k\pi \vee x = -\frac{\pi}{3} + 2k\pi, k \in \mathbb{Z}$$

Se $k = 0$, vem que $x = 0 \in [-\pi, \pi]$

ou $x = \frac{\pi}{3} \in [-\pi, \pi]$ ou $x = -\frac{\pi}{3} \in [-\pi, \pi]$.

Se $k = -1$, vem que $x = -\pi \in [-\pi, \pi]$

ou $x = -\frac{5\pi}{3} \notin [-\pi, \pi]$ ou $x = -\frac{7\pi}{3} \notin [-\pi, \pi]$.

Assim, C.S. = $\left\{-\pi, -\frac{\pi}{3}, 0, \frac{\pi}{3}\right\}$.

3.5. $2 \sin x \cos x + \sin x = 0$

$$2 \operatorname{sen} x \cos x + \operatorname{sen} x = 0$$

$$\Leftrightarrow \operatorname{sen} x (2 \cos x + 1) = 0$$

$$\Leftrightarrow \operatorname{sen} x = 0 \vee 2 \cos x + 1 = 0$$

$$\Leftrightarrow \operatorname{sen} x = 0 \vee \cos x = -\frac{1}{2}$$

$$\Leftrightarrow x = k\pi \vee x = \frac{2\pi}{3} + 2k\pi \vee x = -\frac{2\pi}{3} + 2k\pi, k \in \mathbb{Z}$$

Se $k = 0$, vem que $x = 0 \in [-\pi, \pi[$

ou $x = \frac{2\pi}{3} \in [-\pi, \pi[$ ou $x = -\frac{2\pi}{3} \in [-\pi, \pi[$.

Se $k = -1$, vem que $x = -\pi \in [-\pi, \pi[$

ou $x = -\frac{4\pi}{3} \notin [-\pi, \pi[$ ou $x = -\frac{8\pi}{3} \notin [-\pi, \pi[$.

Assim, C.S. = $\left\{-\pi, -\frac{2\pi}{3}, 0, \frac{2\pi}{3}\right\}$.

3.6. $2 \sin^2 x - \sin x - 1 = 0$

$$2 \operatorname{sen}^2 x - \operatorname{sen} x - 1 = 0$$

$$\Leftrightarrow \operatorname{sen} x = \frac{1 \pm \sqrt{1+8}}{4}$$

$$\Leftrightarrow \operatorname{sen} x = 1 \vee \operatorname{sen} x = -\frac{1}{2}$$

$$\Leftrightarrow x = \frac{\pi}{2} + 2k\pi \vee x = -\frac{\pi}{6} + 2k\pi \vee$$

$$\vee x = \frac{7\pi}{6} + 2k\pi, k \in \mathbb{Z}$$

Se $k = 0$, vem que $x = \frac{\pi}{2} \in [-\pi, \pi[$

ou $x = -\frac{\pi}{6} \in [-\pi, \pi[$ ou $x = \frac{7\pi}{6} \notin [-\pi, \pi[$.

Se $k = -1$, vem que $x = -\frac{5\pi}{2} \notin [-\pi, \pi[$

ou $x = \frac{11\pi}{6} \notin [-\pi, \pi[$ ou $x = -\frac{5\pi}{6} \notin [-\pi, \pi[$.

Assim, C.S. = $\left\{-\frac{5\pi}{6}, -\frac{\pi}{6}, 0\right\}$.