

1ª) (a) $3,14 < \pi < 3,15 \Rightarrow -3,15 < -\pi < -3,14$

Como $a - \pi = a + (-\pi)$, $\left. \begin{array}{l} 5,35 < a < 5,36 \\ -3,15 < -\pi < -3,14 \end{array} \right\} +$

$2,20 < a + (-\pi) < 2,22$

logo

$2,2 < a - \pi < 2,22$

(b) $5,35 < a < 5,36 \Rightarrow -5,36 < -a < -5,35 \Rightarrow -0,36 < 5-a < -0,35$

$3,14 < \pi < 3,15 \Rightarrow 0,14 < \pi - 3 < 0,15$

Queremos estimar; $\frac{5-a}{\pi-3} < 0$, mas $\frac{5-a}{\pi-3} = -\frac{a-5}{\pi-3}$

Vamos estimar primeiro $\frac{a-5}{\pi-3} = (a-5) \cdot \frac{1}{\pi-3} > 0$

$0,14 < \pi - 3 < 0,15 \Rightarrow \left\{ \begin{array}{l} \frac{1}{0,15} < \frac{1}{\pi-3} < \frac{1}{0,14} \end{array} \right. \times$

$-0,36 < 5-a < -0,35 \Rightarrow \left\{ \begin{array}{l} 0,35 < a-5 < 0,36 \\ \frac{0,35}{0,15} < \frac{a-5}{\pi-3} < \frac{0,36}{0,14} \end{array} \right.$

logo $\frac{35}{15} < \frac{a-5}{\pi-3} < \frac{36}{14}$

$2,33 < \frac{7}{3} < \frac{a-5}{\pi-3} < \frac{18}{7} < 2,58$

$\frac{35}{15} = \frac{7}{3}$

$\frac{36}{14} = \frac{18}{7}$

7 13
10 2,333...
18 7
40 2,5214
50
10
30

logo $2,58 < \frac{5-a}{\pi-3} < 2,33$

(2ª) (a) $2 \sin(2x) \cos(3x) - \sin(2x) = 0$

$\sin(2x) [2 \cos(3x) - 1] = 0$

$\sin(2x) = 0$ ou

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

$x = \frac{k\pi}{2}$

$2 \cos(3x) - 1 = 0$

$2 \cos(3x) = 1$

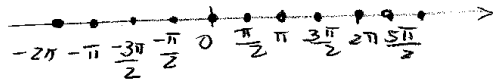
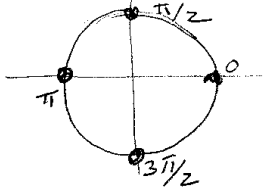
$\cos(3x) = \frac{1}{2}$

$3x = \frac{\pi}{3} + 2k\pi$ ou

$3x = -\frac{\pi}{3} + 2k\pi$
 $x = \frac{\pi}{9} + \frac{2k\pi}{3}$ ou $x = -\frac{\pi}{9} + \frac{2k\pi}{3}$

$$x = \frac{k\pi}{2}$$

$$k \in \mathbb{Z}$$



ou

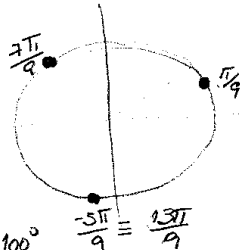
$$x = \frac{\pi}{9} + \frac{2k\pi}{3}, k \in \mathbb{Z}$$

$$k=0: x = \frac{\pi}{9} \leftrightarrow 20^\circ$$

$$k=1: x = \frac{\pi}{9} + \frac{2\pi}{3} = \frac{7\pi}{9} \leftrightarrow 140^\circ$$

$$k=-1: x = \frac{\pi}{9} - \frac{2\pi}{3} = \frac{-5\pi}{9} \leftrightarrow -100^\circ$$

$$k=2: x = \frac{\pi}{9} + \frac{4\pi}{3} = \frac{13\pi}{9} = \frac{-5\pi}{9}$$

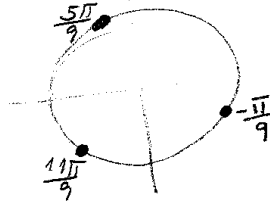


$$\frac{\text{ou}}{x} = -\frac{\pi}{9} + \frac{2k\pi}{3}$$

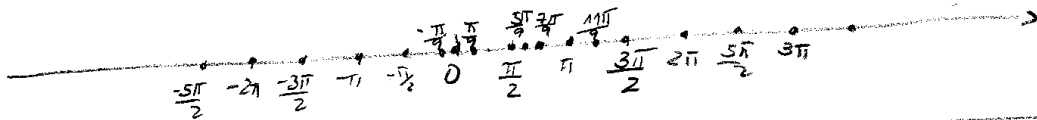
$$k=0, x = -\frac{\pi}{9} \leftrightarrow -20^\circ$$

$$k=1, x = -\frac{\pi}{9} + \frac{2\pi}{3} = \frac{5\pi}{9} \leftrightarrow 100^\circ$$

$$k=2, x = -\frac{\pi}{9} + \frac{4\pi}{3} = \frac{11\pi}{9} \leftrightarrow 220^\circ$$



Na reta numérica (todas as soluções)



$$29)(b) \frac{1}{\cos x \sin x} < \frac{2}{\cos x}$$

$$\frac{1}{\cos x \sin x} - \frac{2}{\cos x} < 0$$

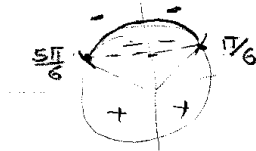
$$\frac{1 - 2 \sin x}{\sin x \cos x} < 0$$

Numeração: $1 - 2 \sin x < 0 \Leftrightarrow$
 $-2 \sin x < -1$
 $\sin x > \frac{1}{2}$

$$p/ 0 < x < 3\pi$$

$$\frac{\pi}{6} + 2\pi = \frac{13\pi}{6}$$

$$\frac{5\pi}{6} + 2\pi = \frac{17\pi}{6}$$



29) b) - continuação

Denominador: $\sin x \cos x = \frac{1}{2} \sin 2x$

$\sin(2x) > 0$

$0 + 2k\pi < 2x < \pi + 2k\pi$



$k=0: 0 < 2x < \pi \Leftrightarrow 0 < x < \frac{\pi}{2}$

$k=1: 2\pi < 2x < 3\pi \Leftrightarrow \pi < x < \frac{3\pi}{2}$

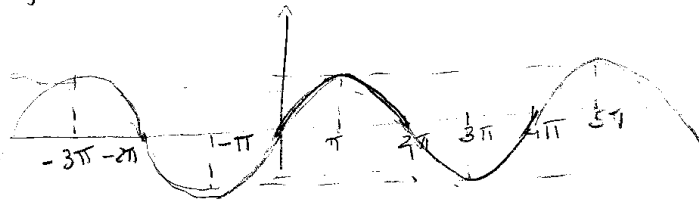
$k=2: 4\pi < 2x < 5\pi \Leftrightarrow 2\pi < x < \frac{5\pi}{2}$

$k=3: 6\pi < 2x < 7\pi \Leftrightarrow 3\pi < x < \frac{7\pi}{2}$

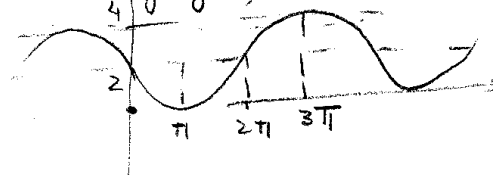
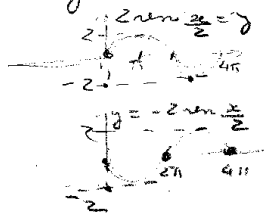
	0	$\frac{\pi}{6}$	$\frac{\pi}{2}$	$\frac{5\pi}{6}$	π	$\frac{3\pi}{2}$	2π	$\frac{13\pi}{6}$	$\frac{5\pi}{2}$	$\frac{7\pi}{6}$	3π								
$1 - 2\sin x$	+	+	0	-	-	0	+	+	+	+	+	0	-	-	0	+	+		
$\sin x \cos x$	0	+	+	+	0	-	-	0	+	0	-	0	+	+	+	0	-	-	0
$\frac{1 - 2\sin x}{\sin x \cos x}$	+	+	0	-	-	0	+	+	+	+	+	0	-	-	0	+	+	+	0

Soluções: $(\frac{\pi}{6}, \frac{\pi}{2}) \cup (\frac{5\pi}{6}, \pi) \cup (\frac{3\pi}{2}, 2\pi) \cup (\frac{13\pi}{6}, \frac{5\pi}{2}) \cup (\frac{7\pi}{6}, 3\pi)$

20) (c) $f(x) = 2 \sin(\frac{x}{4}) \cos(\frac{x}{4}) = \sin(\frac{x}{2})$



$g(x) = 2 - 2 \sin(\frac{x}{4}) \cos(\frac{x}{4}) = 2 - 2 \sin(\frac{x}{2})$



(3) $\frac{3}{4}; \frac{3}{5}; \frac{4}{3}; \frac{4}{5}; -\frac{4}{5}; -\frac{3}{4}$ $\frac{1}{5} > \frac{3}{4}$

$-\frac{4}{5} < -\frac{3}{4} < \frac{3}{5} < \frac{3}{4} < \frac{4}{5} < \frac{4}{3}$

(a) p/ $x > 1$, $x^{-4/5} < x^{-3/4} < x^{3/5} < x^{3/4} < x^{-4/5} < x^{4/3}$

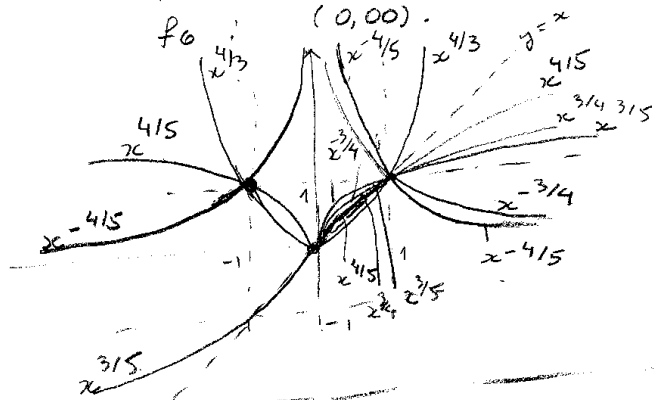
(b) p/ $0 < x < 1$, $x^{4/3} < x^{4/5} < x^{3/4} < x^{3/5} < x^{-3/4} < x^{-4/5}$

(c) Domínio de $f_1: [0, \infty)$

$f_2, f_3, f_4: \mathbb{R} = (-\infty, \infty)$

$f_5: \mathbb{R} - \{0\} = (-\infty, 0) \cup (0, \infty)$

$f_6: (0, \infty)$



$u = 4^{x-3}$
 $u^2 = 4^{2(x-3)}$

$4^{2(x-3)} - 2 \times 4^{x-3} = 3$

$u^2 - 2u - 3 = 0$
 $u = \frac{2 \pm \sqrt{4+12}}{2} = \frac{2 \pm 4}{2} = \begin{cases} \frac{6}{2} = 3 \\ -\frac{2}{2} = -1 \end{cases}$

$4^{x-3} = 3$
 $\log_4 4^{x-3} = \log_4 3$
 $x-3 = \log_4 3$
 $x = 3 + \log_4 3$

(b) domínio = $\{x \in \mathbb{R}; 3-x > 0\}$
 $3-x > 0$
 $x < 3 \Rightarrow$ domínio = $(-\infty, 3)$

$\log_2 (3-x) = \frac{1}{\ln 2}$
 $\ln (3-x) = \frac{1}{\ln 2}$
 $\ln (3-x) = 1$
 $3-x = e \Rightarrow x = 3-e$