Lista 01 - Cálculo I

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1) a) falso, pois: $(p+q)^2 = p^2 + 2 \cdot p \cdot q + q^2$

b) falso, pois : $(a+b)(c+d) = ac + ad + bc + bd$

c) falso

d) falso

e) Verdadeiro

f) falso

g) falso, pois: $(ab)^2 = a^2 \cdot b^2$

h) falso

i) falso, pois: $(a^3)^2 = a^6$

j) falso, pois o sinal negativo só muda com parênteses; ex = $(-5)^2 = 25$ / $-5^2 = 25$

k) falso, pois $ab + ac = a \cdot (b+c)$

l) falso, pois $\left(\frac{a}{b}\right)^{-1} = \left(\frac{b}{a}\right)$

m) falso

n) falso

1) Verdadeiro

p) falso

2) a) $3(x+6)+4(2x-5)$
$3x+18+8x-20$
$\quad 11x-2$

b) $(\sqrt{a}+\sqrt{b})(\sqrt{a}-\sqrt{b})$
$(\sqrt{a})^2-\cancel{\sqrt{a}\sqrt{b}}+\cancel{\sqrt{a}\sqrt{b}}-(\sqrt{b})^2$
$\quad (\sqrt{a})^2-(\sqrt{b})^2$
$\quad\quad \underline{a-b}$

c) $(x+3)(4x-5)$
$4x^2-5x+12x-15$
$\quad 4x^2+7x-15$

d) $(2x+3)^2$
$(2x)^2+2\cdot 2x\cdot 3+3^2$
$\quad 4x^2+12x+9$

e) $(x+\sqrt{3})^2$
$x^2+2x\sqrt{3}+(\sqrt{3})^2$
$\quad x^2+2\sqrt{3}x+3$

f) $(x-2)^3$
$x^3+3\cdot(-2)\cdot x^2+3\cdot(-2)^2\cdot x-2^3$
$x^3-6x^2+12x-8$

g) $\underline{(3-2x)^2}\,(2-3x)$

$3^2 - 2\cdot 3 \cdot 2x + 2^2$

$9 - 12x + 4$

h) $(x+2y-5)^2$

$x^2 + (2y)^2 + (-5)^2 + 2(x)(2y) + 2(x)(-5) + 2(2y)(-5)$

$x^2 + 4y^2 + 25 + 4xy - 10x - 20y$

3) a) $9x^2 - 36$

$9(x^2 - 4)$

b) $x^4 + 27x$

$x(x^3 + 27)$

c) $x^3 - 3x^2 - 4x + 12$

$x^2(x-3) - 4(x-3)$

$(x-3)(x^2-4)$

d) $3x^2 - 18x + 27$

$3(x^2 - 6x + 9)$

e) $2x^2 + 5x - 12$

$(2x^2 + 8x - 3x - 12)$

$(2x^2 + 8x) - (3x + 12)$

$2x(x+4) - 3(x+4)$

$(x+4)(2x-3)$,,

f) $3x^{3/2} - 9x^{1/2} + 6x^{-1/2}$

$3^{-1/2}(x^2 - 3x + 2)$

$3^{-1/2}(x-1)(x-2)$

g) $3x^2 - 7xy - 6y^2$

$a=3 \quad b=-7y \quad c=-6y^2$

$\Delta = b^2 - 4ac = 49 + 72 = 121$

$x = \dfrac{-b \pm \sqrt{\Delta}}{2a} = \dfrac{7 \pm 11}{6} = x' = \boxed{3}$

$x'' = \dfrac{-4}{6} \div 2 = \boxed{\dfrac{-2}{3}}$

$3\left(x + \dfrac{2y}{3}\right)(x-3)$

$\hookrightarrow \quad (3x + 2y)(x-3)$,,

h) $x^3 y - 4xy$

$xy(x^2 - 4)$

i) $x^3 - 3x + 2$

$(x-1) \cdot (x^2 + x - 2) = 0$

$a = 1, b = 1, c = -2$

$\Delta = 1 - (-8) = 9$

$(x-1)(x-1)(x+2)$

$x = -\dfrac{1 \pm 3}{2} = \begin{array}{l} x' = -2, \\ x'' = 1, \end{array}$ $\underset{\text{---}}{\underbrace{(x-1)^2 (x+2)}}$

j) $x^2 + y^2 + z^2 - 2xy + 2xz - 2yz$

$(x + y + z)^2$

4) a) $\dfrac{2}{x} + \dfrac{2}{y} + \dfrac{2}{z} + \dfrac{x}{yz} + \dfrac{y}{xz} + \dfrac{z}{xy} = \dfrac{4}{5}$

$\dfrac{2yz + 2xz + 2xy + x^2 + y^2 + z^2}{xyz} = \dfrac{4}{5} \iff \dfrac{(x+y+z)^2}{xyz} = \dfrac{4}{5}$

$\dfrac{(16)^2}{xyz} = \dfrac{4}{5} \rightarrow \dfrac{\overset{4}{(16)}(16)}{xyz} = \dfrac{4}{5} \Rightarrow \dfrac{64}{xyz} = \dfrac{1}{5}$ $\boxed{xyz = 320}$

R) $\dfrac{4^r - 1}{2^r - 1} = 33$ supondo: $2^r = x,$

$= \dfrac{(2^r)^2 - 1}{2^r - 1} = 33 \rightarrow \dfrac{x^2 - 1}{x - 1} = 33 = \dfrac{(x+1)(x-1)}{x-1} = 33$

$\Rightarrow (x + 1) = 33 \Rightarrow x = 32$

$\hookrightarrow 2^5$

$\boxed{\dfrac{4^5 - 1}{2^5 - 1} = 33}$

método Briot Ruffin

5) a) $(x^4 + 5x^3 - 20x^2 + 4) \div (x+1)$

$x = -1$

$$
\begin{array}{r|rrrrr}
-1 & 1 & 5 & -20 & 0 & 4 \\
\hline
x & 1 & 4 & -24 & 24 & |20 \to resto \\
 & _3 & _2 & _1 & _0
\end{array}
$$

$x^3 + 4x^2 - 24x + 24 \to$ quociente

resto $= 20$

b) $(x^5 + 5x^4 - x^3 - 8x) \div (x-3)$

$x = 3$

$$
\begin{array}{r|rrrrrr}
3 & 1 & 5 & -1 & 0 & -8 & 0 \\
\hline
 & 1 & 8 & 23 & 69 & 199 & |597 \\
 & _4 & _3 & _2 & _1 & _0
\end{array}
$$

$x^4 + 8x^3 + 23x^2 + 69x + 199 \to$ quociente

resto $= 597$

c) $(x^6 + 3x^4 + x^2) \div (x - \sqrt{5})$

$x = \sqrt{5}$

$$
\begin{array}{r|rrrrrr}
\sqrt{5} & 1 & 0 & 3 & 0 & 1 & 0 & 0 \\
\hline
 & 1 & \sqrt{5} & 8 & 8\sqrt{5} & 41 & 41\sqrt{5} & |205 \\
 & _5 & _4 & _3 & _2 & _1 & _0
\end{array}
$$

$x^5 + \sqrt{5}x^4 + 8x^3 + 8\sqrt{5}x^2 + 41x + 41\sqrt{5}$

resto $= 205$

d) $(x^3 + 5x^2 - 20x + 4) \div (x^2 - 4x + 5)$

$$
\begin{array}{l}
x^3 + 5x^2 - 20x + 4 \;\underline{\big|\; x^2 - 4x + 5} \\
-x^3 + 4x^2 - 5x \qquad\quad x + 9 \\
\hline
9x^2 - 25x + 4 \\
-9x^2 + 36x - 45 \\
\hline
11x - 41
\end{array}
$$

quociente $= x + 9$

resto $= 11x + 41$

6) a) $a(bx - c) \geq bc$

$abx - ac \geq bc$

$abx \geq bc + ac$

$abx \geq c(b+a)$

$\dfrac{abx}{ab} \geq \dfrac{c(b+a)}{ab} \to x \geq \dfrac{c(b+a)}{ab}$

b) $ax + b < c$

$ax < c - b$

$\dfrac{ax}{a} < \dfrac{c-b}{a} \Rightarrow x > \dfrac{c-b}{a}$

$\curvearrowright a < 0$

c) $a \leq bx + c < 2a$

$a \leq bx + c$ $bx + c < 2a$

$\hookrightarrow a - c \leq bx$ $\hookrightarrow bx < 2a - c$

$\hookrightarrow \dfrac{a-c}{b} \leq x$ $x < \dfrac{2a-c}{b}$ //

//

$\dfrac{a-c}{b} \leq x < \dfrac{2a-c}{b}$

d) $\dfrac{ax + b}{c} \leq b$

$\left(\dfrac{ax+b}{c}\right) \cdot c \leq bc$

$ax + b \leq bc$

$ax \leq bc - b$

$x \leq \dfrac{bc - b}{a}$ //

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7) a) $x(2x - 1) \geq 0$

estudo do sinal

	0	½	
x	−	+	+
$(2x-1)$	−	−	+
PROD.	+	−	+

$S = \,]-\infty, 0] \cup [½, \infty[$

$\{x \in \mathbb{R} \,/\, x \leq 0 \text{ ou } x \geq ½\}$

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b) $(2x - 1) \leq 0$ ½ e 3 (raiz)

   $(x - 3)$

	½	3	
$(2x-1)$	−	+	+
$(x-3)$	−	−	+
PROD.	+	−	+

$S = [½, 3]$

$\{x \in \mathbb{R} \,/\, ½ \leq x \geq 3\}$

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c) $(x - 2)(x + 2) > 0$

	-2	2	
$(x+2)$	−	+	+
$(x-2)$	−	−	+
PROD.	+	−	+

$S = \,]-\infty, -2[\,\cup\,]2, +\infty[$

$\{x \in \mathbb{R} \,/\, x < -2 \text{ ou } x > 2\}$

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

d) $\dfrac{x(2x-1)}{(x+1)} \geq 0 \qquad \rightarrow$ cond. de existência

$\qquad\qquad\qquad \rightarrow \boxed{x \neq 1}$

	-1	0	½
x	$-$	$-$	$+$	$+$
$(2x-1)$	$-$	$-$	$-$	$+$
$(x+1)$	$-$	$+$	$+$	$+$
PROD.	$-$	$+$	$-$	$+$

$S =]-1, 0] \cup [1/2, \infty[$

e) $x(2x-3)(x^2+1) < 0 \qquad\qquad 0, \frac{3}{2}$

	0	3/2
x	$-$	$+$	$+$
$(2x-3)$	$-$	$-$	$+$
(x^2+1)	$+$	$+$	$+$
PROD.	$+$	$-$	$+$

$S =]0, \frac{3}{2}]$

$\{x \in \mathbb{R} \mid 0 < x < 3/2\}$

f) $(x-1)(3x-4)^2 \leq 0 \qquad x = 1, \qquad (3x-4)^2 = 0$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad 3x - 4 = 0$

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

	1	4/3
$(x-1)$	$-$	$+$	$+$
$(3x-4)^2$	$-$	$-$	$+$
PROD.	$+$	$-$	$+$

$S = [1, \frac{4}{3}]$

$\{x \in \mathbb{R} \mid 1 < x < 4/3\}$
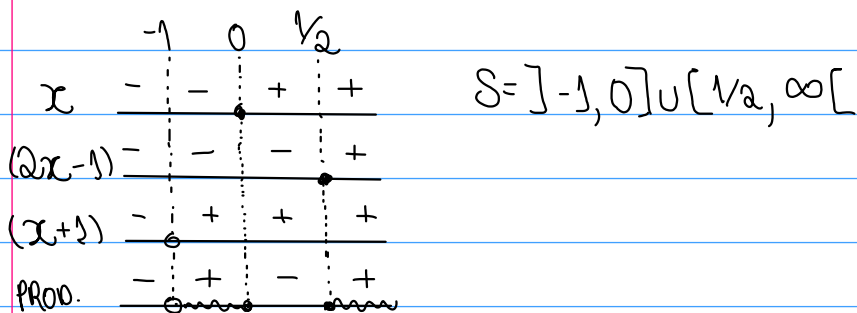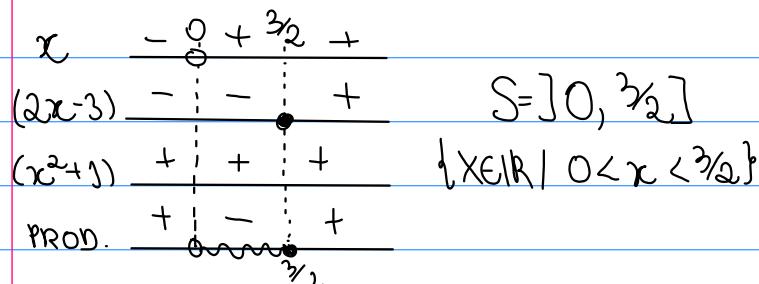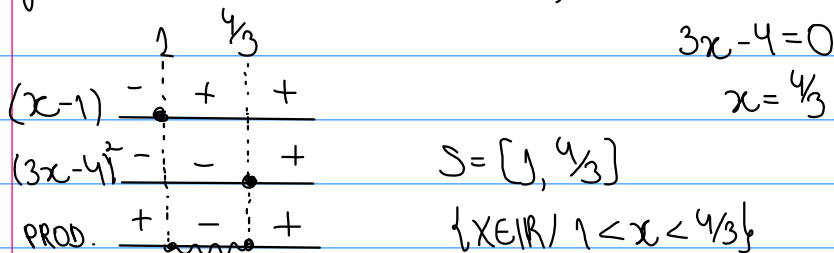
8) a) $3 - x < 5 + 3x$

$\quad -x < 5 - 3 + 3x$

$\quad -x < 2 + 3x$

$\quad -4x < 2 \quad (x-1)$

$\quad 4x > -2$

$\quad x > \dfrac{-2}{4} = \boxed{x > \dfrac{-1}{2}}$

b) $2 > -3 - 3x \geq -7$

$\cdot \; 2 > -3 - 3x \; \vdots \; \cdot -3 - 3x \geq 7$

$(x-1) \; 2 + 3 > -3x \qquad -3x \geq 10^{(x-1)}$

$\qquad -5 > x \qquad\qquad 3x \leq -10$

$\qquad \dfrac{-5}{3} > x \qquad\qquad x \leq \dfrac{-10}{3}$

R. $\boxed{\dfrac{-5}{3} > x \leq \dfrac{-10}{3}} \rightarrow$

$\hookrightarrow S = [\frac{-10}{3}, \frac{-5}{3}[$
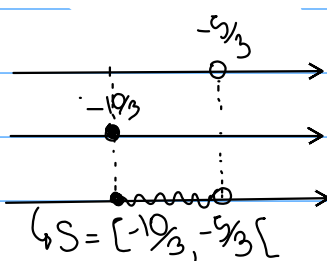
c) $\dfrac{5}{x} < \dfrac{7}{4} \qquad = 4 \cdot 5 < 7 \cdot x$

$\qquad\qquad 20 < 7x$

$\qquad \boxed{x > \dfrac{20}{7}}$
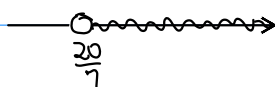
$S =]\frac{20}{7}, +\infty[$

d) $1-x-2x^2 \geqslant 0$

$\quad -2x^2 - x + 1 \geqslant 0 \quad (x-1)$

$\quad\quad 2x^2 + x - 1 \leq 0 \rightarrow$ Baskara!

$\Delta = b^2 - 4ac = 1 + 8 = 9$

$x = \dfrac{-b \pm \sqrt{\Delta}}{2a} = \dfrac{-1 \pm 3}{4} = \begin{array}{l} x' = -1 \\ x'' = \frac{2}{4} \end{array} \Big\} \longrightarrow$
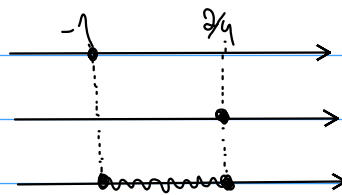
e) $x^3 + 1 > x^2 + x$

$\underbrace{x^3 - x^2}\ \underbrace{-x + 1} > 0$

$x^2(x-1) - (x-1) > 0$

$(x-1)\underbrace{(x^2 - 1)} > 0 \qquad\qquad (x-1)$

$(x-1)(x+1)(x-1) > 0 \qquad \longrightarrow$
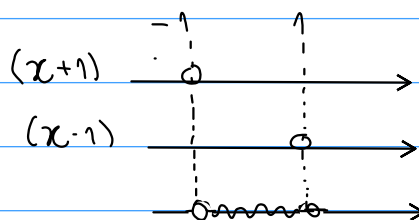
f) $\underbrace{8x^3 - 4x^2}\ \underbrace{-2x+1} < 0 \qquad\qquad x = \frac{-1}{2} \text{ e } x = 1$

$4x^2(2x-1) - 1(2x-1) < 0$

$(2x-1)(4x^2 - 1) < 0 \qquad\qquad (x-1)$

$(2x-1)(2x+1)(2x-1) < 0 \qquad (2x+1)$

$\quad (2x-1)^2 (2x+1) < 0$
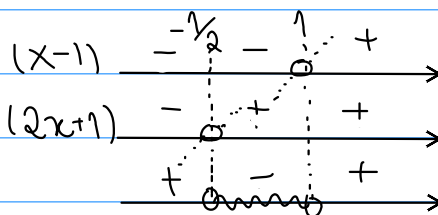
g) $(x-1)^2 < 4$

$\sqrt{(x-1)^2} < \sqrt{4} \qquad \leadsto \sqrt{}^x \Rightarrow \text{módulo}$

$|x-1| < 2$

$-(x-1) < 2 \qquad\qquad x - 1 < 2 \qquad\qquad x < 3$

$-x + 1 < 2 \qquad\qquad\quad x < 3 \qquad\qquad\quad x > -1$

$-x < 1 \quad (x-1) \qquad\qquad\qquad\qquad\qquad\quad S =$

$\quad x > -1$

$\qquad\qquad\qquad \rightarrow x \neq 5$
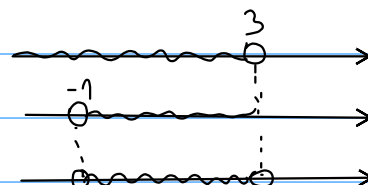
h) $\dfrac{3}{x-5} > 2 \;\rightarrow\; \dfrac{3 - 2(x-5)}{x-5} > 0 \;\rightarrow\; \dfrac{3 - 2x + 10}{x - 5} > 0 \;\rightarrow\; \dfrac{13 - 2x}{x-5} > 0$

$\begin{cases} 13 - 2x > 0 \rightarrow x < \frac{13}{2} \\ x - 5 > 0 \rightarrow x > 5 \end{cases}$

$\underset{\Rightarrow}{S=}$
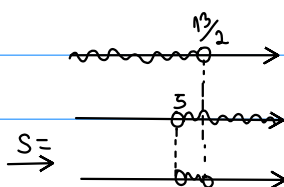
$$x \neq \tfrac{3}{2}$$

i) $\dfrac{x}{2x-3} \leq 3 \rightarrow \dfrac{x-3}{2x-3} \leq 0 \rightarrow \dfrac{x-3(2x-3)}{2x-3} \leq 0 \rightarrow \dfrac{x-6x+9}{2x-3} \leq 0$

$\rightarrow \begin{cases} -5x+9 \leq 0 \rightarrow x \geq \tfrac{9}{5} \\ 2x-3 \leq 0 \rightarrow x \leq \tfrac{3}{2} \rightarrow x < \tfrac{3}{2} \end{cases}$
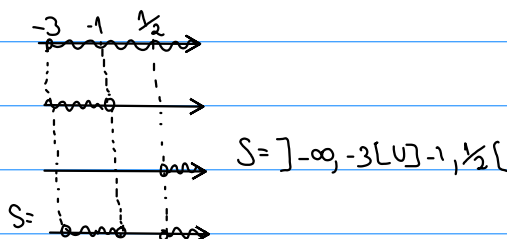
$S = \quad \quad \quad S = \emptyset \quad]-\infty, \tfrac{3}{2}[\quad [\tfrac{9}{5}, +\infty[$
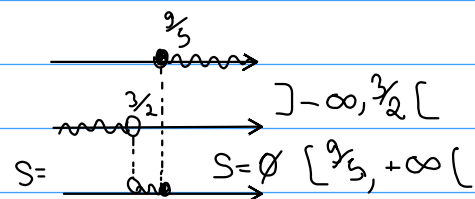
j) $\dfrac{x-3}{x^2+1} < 0 \rightarrow x^2 < -1 \rightarrow$ nunca se anula!
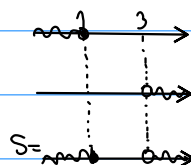
$x < 3 \quad = \quad$

k) $\dfrac{2x^2+5x-3}{x+1} < 0 \qquad x \neq -1$

$x < -1$

$\Delta = b^2 - 4ac \Rightarrow 25 + 24 = 49$

$x = \dfrac{-b \pm \sqrt{\Delta}}{2a} = \dfrac{-5 \pm 7}{4} = \begin{array}{l} x' = \tfrac{2}{4} = \tfrac{1}{2} \\ x'' = \tfrac{12}{4} = 3 \end{array}$
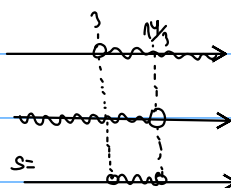
$S =]-\infty, -3[\cup]-1, \tfrac{1}{2}[$

$S =$

l) $\dfrac{1-x}{3-x} \geq 0 \begin{cases} -x \geq -1 \; (x-1) \Rightarrow x \leq 1 \\ -x \geq -3 \; (x-1) \Rightarrow x \leq 3 \end{cases}$
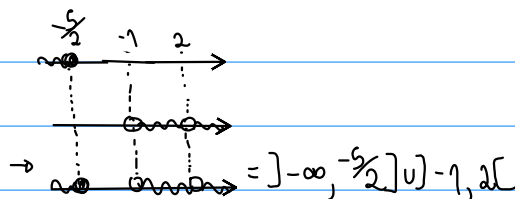
$\hookrightarrow \underline{x \neq 3}$

$S =$

m) $\dfrac{2x-1}{x-3} > 5 \rightarrow \dfrac{2x-1-5}{x-3} > 0 \rightarrow \dfrac{2x-1-5(x-3)}{x-3} > 0 \rightarrow \dfrac{2x-1-5x+15}{x-3} > 0 \rightarrow \dfrac{-3x+14}{x-3} > 0$

$\begin{cases} -3x+14 > 0 \rightarrow x < \tfrac{14}{3} \\ x-3 > 0 \rightarrow x > 3 \end{cases}$

$S =$

n) $\dfrac{1}{x+1} \geq \dfrac{3}{x-2} \begin{array}{l} 0 \, x \neq -1 \\ 0 \, x \neq 2 \end{array} \rightarrow \dfrac{1}{x+1} - \dfrac{3}{x-2} \geq 0 \overset{mmc}{\rightarrow} \dfrac{x-2-3x-3}{(x+1)\cdot(x-2)} \rightarrow \dfrac{-2x-5}{(x+1)(x-2)} \geq 0$

$\begin{cases} -2x-5 \geq 0 \qquad x \leq \tfrac{-5}{2} \\ (x+1)(x-2) \geq 0 \quad x \geq 2 \cdot x \geq -1 \end{cases}$

$\rightarrow \quad =]-\infty, \tfrac{-5}{2}] \cup]-1, 2[$

$50 \leq F \leq 95$

9)a) $C = \dfrac{5}{9}(F - 32)$ $C = \dfrac{5}{9}(95 - 32)$

$9c = 5(50 - 32)$ $9C = 5 \cdot 63$

$C = \dfrac{90}{9} = \boxed{10°C}$ $C = \dfrac{315}{9} = \boxed{35°C}$

Portanto, $10 \leq C \leq 35°C$.

b) $h(t) = 30 + 10t - 5t^2$

$15 = 30 + 10t - 5t^2$

$0 = 10t - 5t^2 + 15 \ (\div 5)$

$-t^2 + 2t + 3 = 0 \rightarrow$ Bhaskara

$\Delta = b^2 - 4AC = 4 + 12 = 16$

$x = \dfrac{-b \pm \sqrt{\Delta}}{2a} = \dfrac{-2 \pm 4}{-2} = \begin{array}{l} x' = 3 \\ x'' = -1 \end{array} \left.\right\} \quad -1 \leq t \leq 3$

$\rightarrow$ Tempo não pode ser negativo

Logo, $\boxed{0 \leq t \leq 3}$

10) a) $|5x - 3| = 12$

$5x - 3 = 12$ $-(5x - 3) = 12$ b) $|-4 + 12x| = 7$

$5x = 15$ $-5x + 3 = 12$ $-4 + 12x = 7$ $-(-4 + 12x) = 7$

$\boxed{x = 3}$ $\boxed{x = -\dfrac{9}{5}}$ $12x = 11$ $4 - 12x = 7$

          $\boxed{x = \dfrac{11}{12}}$ $x = -\dfrac{3}{12} \Rightarrow \boxed{-\dfrac{1}{4}}$

c) $|2x - 3| = |7x - 5|$

$2x - 3 = 7x - 5$ $2x - 3 = -7x + 5$

$5x = 2$ $9x = 8$

$\boxed{x = \dfrac{2}{5}}$ $\boxed{x = \dfrac{8}{9}}$

d) $\left|\dfrac{x + 2}{x - 2}\right| = 5$ $x \neq 2$

$\dfrac{x + 2}{x - 2} = \dfrac{5}{1}$ $\dfrac{x + 2}{x - 2} = \dfrac{-5}{1}$

$x + 2 = 5x - 10$ $x + 2 = -5x + 10$

$-4x = -8$ $6x = 8$

$\boxed{x = 2}$ $x = \dfrac{8}{6} \xrightarrow{\div 2} \boxed{x = \dfrac{4}{3}}$

$S = \left\{\dfrac{4}{3}\right\}$

e) $|3x+2|=5-x$

$3x+2=5-x$ $\qquad$ $-3x-2=5-x$

$\quad 4x=3$ $\qquad\qquad$ $-2x=7$

$\boxed{x=\dfrac{3}{2}}$ $\qquad\qquad$ $\boxed{x=-\dfrac{7}{2}}$

f) $|9x|-11=x$

$9x-11=x$ $\qquad$ $-9x-11=x$

$\quad 8x=11$ $\qquad\qquad$ $-10x=11$

$\boxed{x=\dfrac{11}{8}}$ $\qquad\qquad$ $\boxed{x=-\dfrac{10}{11}}$

g) $|x-3|+|x+1|=4$

$x-3+x+1=4$ $\qquad$ $-x+3-x-1=4$

$\quad 2x=6$ $\qquad\qquad$ $-2x=2$

$\boxed{x=3}$ $\qquad\qquad$ $\boxed{x=-1}$

11) a) $|x|<3$

$x<3 \quad x>-3$

$S=]-3,3[$

b) $\left|\dfrac{z}{5}-1\right|\leq1$ $\quad^{(\times5)}$

$\dfrac{z}{5}-1\leq1$

$\dfrac{z}{5}$

$z-5\leq5 \qquad \dfrac{z}{5}-1\geq-1 \qquad z-5\geq-5$

$z\leq10\!/\!/ \qquad\qquad\qquad\qquad z\geq0\!/\!/$

$S=[0,10]$

c) $|1-x|>1$

$1-x>1$ $\qquad$ $1-x<-1$

$-x>0 \;{}^{(\cdot-1)}$ $\qquad$ $-x<-2\;{}^{(\cdot-1)}$

$x<0$ $\qquad\qquad$ $x>2$

$\quad S=]0,2[$

d) $|t-1|\leq3$

$t-1\leq3 \qquad t-1\geq-3$

$t\leq4 \qquad\quad t\geq-2$

$S=[-2,4]$

e) $\left|3-\dfrac{1}{x}\right|<\dfrac{1}{2}$

$-\dfrac{1}{x}<\dfrac{1}{2}-3 \;\to\; -\dfrac{1}{x}<-\dfrac{5}{2}\;(x-1)\;\to\;\dfrac{1}{x}>\dfrac{5}{2}\;\to\;x>\dfrac{2}{5}\!/\!/$

$3-\dfrac{1}{x}>-\dfrac{1}{2}\;\to\;-\dfrac{1}{x}>-\dfrac{1}{2}-3\;\to\;-\dfrac{1}{x}>\dfrac{-7}{2}\;(x-1)\to\dfrac{1}{x}<\dfrac{7}{2}\;\to\;x<\dfrac{2}{7}\!/\!/$

$S=]\tfrac{2}{7},\tfrac{2}{5}[$

f) $|6+2x|<|4-x|$

$3x<-2 \qquad\qquad 6+2x<-4+x \qquad S=]-\tfrac{2}{3},-10[$

$x<-\dfrac{2}{3} \qquad\qquad\quad x<-10$

g) $|x-1|+|x+2| \geqslant 4$

$2x+1 \geqslant 4$ $2x+1 \leq -4$

$x \geqslant \dfrac{3}{2}$ $x \leq \dfrac{-5}{2}$

$S = \left[-\dfrac{5}{2}, \dfrac{3}{2}\right]$

h) $|x|+1 < x$ DÚVIDA

$x+1 < x$ $x+1 > -x$

$\underbrace{x-x < -1}_{\varnothing}$ $2x > -1$

               $x > \dfrac{-1}{2}$

$S = \varnothing \; \left]-\dfrac{1}{2}\right[$

i) $\dfrac{1}{|x+1||x-3|} \geqslant \dfrac{1}{5}$ $\begin{cases} x \neq -1 \\ x \neq 3 \end{cases}$

$\circ \; \dfrac{1}{(x+1)(x-3)} \geqslant \dfrac{1}{5} \rightarrow = |x+1||x-3| \leq 5$

$\bullet \, (x+1)(x-3) \leq 5 \Rightarrow x^2 - 3x + x - 3 - 5 \leq 0$

                      $x^2 - 2x - 8 \leq 0$

$\Delta = b^2 - 4ac \Rightarrow 4 + 32 = 36$

$x = \dfrac{-b \pm \sqrt{\Delta}}{2a} = \dfrac{2 \pm 6}{2} = \begin{array}{l} x' = 4 \\ x'' = -2 \end{array}$

$\bullet \, (-x-1)(x+3) \leq 5 \rightarrow -x^2 - 3x - x - 3 - 5 \leq 0$

                      $-x^2 - 4x - 8 \leq 0$

$\Delta = b^2 - 4ac = 16 - 32 = -16$

$x = \dfrac{4 \pm 4}{-2} = \begin{array}{l} x' = -4 \\ x'' = 0 \end{array}$

$\bullet \, (x+1)(-x+3) \leq 5$

$-x^2 + 3x - x + 3 - 5 \leq 0$

    $-x^2 + 2x - 2 \leq 0$

$\Delta = b^2 - 4ac = 4 - 8 = -4$

$x = \dfrac{-b \pm \sqrt{\Delta}}{2a} = \dfrac{-2 \pm 2}{-2} = \begin{array}{l} x' = 0 \\ x'' = 2 \end{array}$

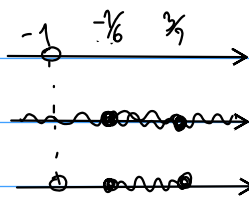$\bullet \, (-x-1)(-x+3) \leq 5$

$x^2 - 3x + x - 3 - 5 \leq 0$

    $x^2 - 2x - 8 \leq 0$

$S = \left[-2, -1\right[\cup \left]-1, 3\right[\cup \left]3, 4\right]$

j) $\left|\dfrac{3-2x}{1+x}\right| \leq 4$ $x \neq -1$

$\dfrac{3-2x-4(1+x)}{1+x} \leq 0 \rightarrow \dfrac{3-2x-4-4x}{1+x} \leq 0 \rightarrow \begin{cases} \dfrac{-6x-1}{1+x} \leq 0 & x \geqslant -\frac{1}{6} \\ & x \leq -1 \end{cases}$

$\dfrac{-3+2x-4(-1x-x)}{-1-x} \rightarrow \dfrac{-3+2x+4x+x}{-1-x} \leq 0 \rightarrow \begin{cases} 7x-3 \leq 0 & x \leq \frac{3}{7} \\ -1-x \leq 0 & x \geqslant -1 \end{cases}$

$$\underset{-1 \quad -7/6 \quad 3/7}{\xrightarrow{\hspace{3cm}}}$$

$$S =]-\infty, \tfrac{-7}{2}] \cup [\tfrac{-7}{6}, +\infty[$$

15) $1 < |x+2| < 4$

$|x+2| > 1 \qquad x+2 < -1 \ \vdots \ x+2 < 4 \quad x+2 > -4$

$x > -1 \qquad x < -3 \ \vdots \ x < 2 \qquad x > -6$

$S =]-3, -1[\cup]-6, 2[$