data fecha 06.04.21

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Lista de Exercícios - Matemática 1 - Semana 6

1) Simplificar as frações

a) $\frac{96}{36} \overset{:12}{=} \frac{8}{3}$

96, 36	2
48, 18	2
24, 9	2
12, 9	2
6, 9	2
3, 9	3
1, 3	3
1, 1	12

b) $\frac{24}{18} \overset{:6}{=} \frac{4}{3}$

24, 18	2
12, 9	2
6, 9	2
3, 9	3
1, 3	3
1, 1	6

c) $\frac{12}{48} \overset{:12}{=} \frac{1}{4}$

12, 48	2
6, 24	2
3, 12	2
3, 6	2
3, 3	3
1, 1	12

d) $\frac{30}{24} \overset{:6}{=} \frac{5}{4}$

30, 24	2
15, 12	2
15, 6	2
15, 3	3
5, 1	5
1, 1	6

e) $\frac{42}{16} \overset{:2}{=} \frac{21}{8}$

42, 16	2
21, 8	2
21, 4	2
21, 2	2
21, 1	3
7, 1	7
1, 1	2

f) $\frac{33}{15} \overset{:3}{=} \frac{11}{5}$

33, 15	3
11, 5	5
11, 1	11
1, 1	3

g) $\frac{24}{12} \overset{:12}{=} \frac{2}{1} = 2$

24, 12	2
12, 6	2
6, 3	2
3, 3	3
1, 1	12

h) $\frac{30}{30} \overset{:30}{=} \frac{1}{1} = 1$

30, 30	2
15, 15	3
5, 5	5
1, 1	30

i) $\frac{12}{24} \overset{:12}{=} \frac{1}{2}$

12, 24	2
6, 12	2
3, 6	2
3, 3	3
1, 1	12

j) $\frac{32}{12} \overset{:4}{=} \frac{8}{3}$

32, 12	2
16, 6	2
8, 3	2
4, 3	2
2, 3	2
1, 3	3
1, 1	4

2) Efetue as operações:

data / fecha 06 · 04 · 21

a) $\frac{4}{15} - \left(\frac{2}{3} \cdot \frac{9}{10}\right) = \frac{4}{15} - \left(\frac{18}{30}\right)^{:6} = \frac{4}{15} - \frac{3}{5} =$

15, 5	3
5, 5	5
1, 1	15

18, 30	2
9, 15	3
3, 5	3
1, 5	5
1, 1	6

$= \frac{4-9}{15} = -\frac{5}{15}^{:5} = -\frac{1}{3}$

b) $\left(\frac{5}{16} + \frac{1}{8}\right) \div \left(\frac{5}{4} - \frac{1}{12}\right) = \left(\frac{5+2}{16}\right) \div \left(\frac{15-1}{12}\right) =$

4, 12	2
2, 6	2
1, 3	3
1, 1	12

16, 8	2
8, 4	2
4, 2	2
2, 1	2
1, 1	16

$= \frac{7}{16} \div \left(\frac{14}{12}^{:2}\right) = \frac{7}{16} \div \frac{7}{6} = \frac{7}{16} \times \frac{6}{7} = \frac{42}{112}^{:14} =$

42, 112	2
21, 56	2
21, 28	2
21, 14	2
21, 7	3
7, 7	7
1, 1	14

$= +\frac{3}{8}$

c) $\left(\frac{2}{1} + \frac{1}{3}\right) \div \frac{14}{1} - \left(\frac{1}{9} - \frac{1}{3}\right) = \left(\frac{6+1}{3}\right) \div \frac{14}{1} - \left(\frac{1-3}{9}\right) =$

1, 3	3
1, 1	3

9, 3	3
3, 1	3
1, 1	9

$= \left(\frac{7}{3} \div \frac{14}{1}\right) - \left(\frac{-2}{9}\right) = \left(\frac{7}{3} \times \frac{1}{14}\right) + \frac{2}{9} =$

$= \left(\frac{7}{42}^{:7}{}_{:7}\right) + \frac{2}{9} = \frac{1}{6} + \frac{2}{9} = \frac{3+4}{18} = +\frac{7}{18}$

d) $\left(\frac{\frac{1}{1} - \frac{3}{2}}{\frac{1}{1} + \frac{1}{4}}\right) \cdot \frac{5}{3} = \left(\frac{2-3}{\frac{4+1}{4}}\right) \cdot \frac{5}{3} = \left(\frac{\frac{-1}{2}}{\frac{5}{4}}\right) \cdot \frac{5}{3} =$

6, 9	2
3, 9	3
1, 3	3
1, 1	18

7, 42	2
7, 21	3
7, 7	7
1, 1	7

$= \left(-\frac{1}{2} \cdot \frac{4}{5}\right) \cdot \frac{5}{3} = \left(\frac{-4}{10}^{:2}{}_{:2}\right) \cdot \frac{5}{3} = \left(-\frac{2}{5} \cdot \frac{5}{3}\right) = -\frac{10}{40}^{:10}{}_{:10} = -\frac{1}{4}$

40, 10	2
20, 5	2
10, 5	2
5, 5	5
1, 1	10

$-\frac{2}{5} \cdot \frac{5}{3} = -\frac{10}{15}^{:5}{}_{:5} = -\frac{2}{3}$

data fecha 06 . 04 . 21

3) Resolver as equações de segundo grau dadas por:

a) $5x^2 - 3x - 2 = 0$

$a = 5$, $b = -3$, $c = -2$

$\Delta = b^2 - 4.a.c$

$\Delta = (-3)^2 - 4.5.(-2)$

$\Delta = 9 + 40$

$\Delta = +49$, $\Delta > 0$

$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2.a}$

$x_1 = \frac{3 - \sqrt{49}}{2.5} = \frac{3-7}{10} = \frac{-4:2}{10:2} = -\frac{2}{5}$

$x_2 = \frac{3 + \sqrt{49}}{2.5} = \frac{3+7}{10} = \frac{10}{10} = 1$

$S = \{-\frac{2}{5}, 1\}$ $x_1 = -2/5$, $x_2 = 1$

b) $3x^2 + 55 = 0$

$a = 3$, $b = 0$, $c = 55$

$\Delta = b^2 - 4.a.c$

$\Delta = 0 - 4.3.55$

$\Delta = 0 - 660$

$\Delta = -660$, $\Delta < 0$

$S = \{\emptyset\}$, $x \notin \mathbb{R}$

+ Pelo delta ser menor que 0, não existe raiz real p/ essa equação.

c) $x^2 - 10x + 25 = 0$

$a = 1$, $b = -10$, $c = 25$

$\Delta = b^2 - 4.a.c$

$\Delta = (-10)^2 - 4.1.25$

$\Delta = 100 - 100$

$\Delta = 0$

$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{+10 \pm 0}{2.1} = \frac{+10}{2} = +5$

$S = \{+5, \cancel{+5}\}$ $x_1 = +5$, $x_2 = +5$

d) $x^2 - 6x = 0$

$a = 1$, $b = -6$, $c = 0$

$\Delta = b^2 - 4.a.c$

$\Delta = (-6)^2 - 4.1.0$

$\Delta = 36 - 0$

$\Delta = 36$, $\Delta > 0$

$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2.a}$

$x_1 = \frac{6 - \sqrt{36}}{2.1} = \frac{6-6}{2} = \frac{0}{2} = 0$

$x_2 = \frac{6 + \sqrt{36}}{2.1} = \frac{6+6}{2} = \frac{12}{2} = 6$

$S = \{0, 6\}$

$x_1 = 0$, $x_2 = 6$

data
fecha 06.04.24

e) $x^2 - x - 20 = 0$

$a = 1$, $b = -1$, $c = -20$

$\Delta = b^2 - 4.a.c$

$\Delta = (-1)^2 - 4.1.(-20)$

$\Delta = 1 + 80$

$\Delta = 81$, $\Delta > 0$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2a}$

$x_1 = \frac{1 - \sqrt{81}}{2.1} = \frac{1-9}{2} = \frac{-8}{2} = -4$

$x_2 = \frac{1 + \sqrt{81}}{2.1} = \frac{1+9}{2} = \frac{10}{2} = 5$

$S = \{-4, 5\}$

$x_1 = -4$, $x_2 = 5$

f) $x^2 - 8x + 7 = 0$

$a = 1$, $b = -8$, $c = 7$

$\Delta = b^2 - 4.a.c$

$\Delta = (-8)^2 - 4.1.7$

$\Delta = 64 - 28$

$\Delta = 36$, $\Delta > 0$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a}$

$x_1 = \frac{8 - \sqrt{36}}{2.1} = \frac{8-6}{2} = \frac{2}{2} = 1$

$x_2 = \frac{8 + \sqrt{36}}{2.1} = \frac{8+6}{2} = \frac{14}{2} = 7$

$S = \{1, 7\}$

$x_1 = +1$, $x_2 = +7$

g) $3x^2 - 15x + 12 = 0$

$a = 3$, $b = -15$, $c = 12$

$\Delta = b^2 - 4.a.c$

$\Delta = (-15)^2 - 4.3.12$

$\Delta = 225 - 144$

$\Delta = 81$, $\Delta > 0$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a}$

$x_1 = \frac{15 - \sqrt{81}}{2.3} = \frac{15-9}{6} = \frac{6}{6} = 1$

$x_2 = \frac{15 + \sqrt{81}}{2.3} = \frac{15+9}{6} = \frac{24:6}{6:6} = \frac{4}{1} = 4$

$S = \{1, 4\}$

$x_1 = +1$, $x_2 = +4$

h) $x^2 - 5x + 6 = 0$

$a = 1$, $b = -5$, $c = 6$

$\Delta = b^2 - 4.a.c$

$\Delta = (-5)^2 - 4.1.6$

$\Delta = 25 - 24$

$\Delta = 1$, $\Delta > 0$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a}$

$x_1 = \frac{5 - \sqrt{1}}{2.1} = \frac{5-1}{2} = \frac{4}{2} = 2$

$x_2 = \frac{5 + \sqrt{1}}{2.1} = \frac{5+1}{2} = \frac{6}{2} = 3$

$S = \{2, 3\}$

$x_1 = 2$, $x_2 = 3$

data fecha 06·04·24

i) $2x^2 - 7x = 15$

$2x^2 - 7x - 15 = 0$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a}$

$S = \{-\frac{3}{2}, 5\}$ $x_1 = -\frac{3}{2}$, $x_2 = 5$

$a = 2$

$b = -7$

$c = -15$

$\Delta = b^2 - 4.a.c$

$\Delta = (-7)^2 - 4.2.(-15)$

$\Delta = 49 + 120$

$\Delta = 169$, $\Delta > 0$

$x_1 = \frac{7 - \sqrt{169}}{2.2} = \frac{7-13}{4} = \frac{-6:2}{4:2} = -\frac{3}{2}$

$x_2 = \frac{7 + \sqrt{169}}{2.2} = \frac{7+13}{4} = \frac{20:4}{4:4} = \frac{5}{1} = 5$

j) $4x^2 + 9 = 12x \Rightarrow 4x^2 - 12x + 9 = 0$

$a = 4$

$b = -12$

$c = 9$

$\Delta = b^2 - 4.a.c$

$\Delta = (-12)^2 - 4.4.9$

$\Delta = 144 - 144$

$\Delta = 0$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a} = x_{(1,2)} = \frac{12 \pm 0}{2.4}$

$x_{(1,2)} = \frac{12:4}{8:4} = \frac{3}{2}$ $x_1 = x_2 = \frac{3}{2}$

$S = \{3/2, 3/2\}$

k) $2x^2 = -12x - 18 \Rightarrow 2x^2 + 12x + 18 = 0$

$a = 2$

$b = 12$

$c = 18$

$\Delta = b^2 - 4.a.c$

$\Delta = 12^2 - 4.2.18$

$\Delta = 144 - 144$

$\Delta = 0$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a} = \frac{-12 \pm 0}{2.2} = \frac{-12:4}{4:4} =$

$x_{(1,2)} = \frac{-3}{1} = -3$ $x_1 = x_2 = -3$

$S = \{-3\}$

l) $2x = 15 - x^2 \Rightarrow x^2 + 2x - 15 = 0$ X

Fez correto abaixo

$a = 1$

$b = 2$

$c = -15$

$\Delta = b^2 - 4.a.c$

$\Delta = 2^2 - 4.1.(-15)$

$\Delta = 4 + 60$

$\Delta = 64$, $\Delta > 0$

$x_1 = \frac{-2 - \sqrt{64}}{2.1} = \frac{-2-64}{2} = \frac{-66}{2} = -33$

$x_2 = \frac{-2 + \sqrt{64}}{2.1} = \frac{-2+64}{2} = \frac{62}{2} = 31$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a}$

$S = \{-33, 31\}$

$x_1 = -33$, $x_2 = 31$

data fecha 06.04.24

m) $3x^2 + 5x = -x - 9 + 2x^2$

$3x^2 - 2x^2 + 5x + x + 9 = 0$

$x^2 + 6x + 9 = 0$ ✓

$S = \{-3\}$

$a = 1$	$\Delta = b^2 - 4.a.c$
$b = 6$	$\Delta = 6^2 - 4.1.9$
$c = 9$	$\Delta = 36 - 36$
	$\Delta = 0$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a} \Rightarrow x_{(1,2)} = \frac{-6 \pm \sqrt{0}}{2.1} =$

$= \frac{-6 \pm 0}{2} = \frac{-6}{2} = -3$ // $x_1 = x_2 = -3$ //

n) $x^2 + x - 7 = 5 \Rightarrow x^2 + x - 7 - 5 = 0 \Rightarrow x^2 + x - 12 = 0$

$a = 1$	$\Delta = b^2 - 4.a.c$
$b = 1$	$\Delta = 1^2 - 4.1.(-12)$
$c = -12$	$\Delta = 1 + 48$
	$\Delta = 49$, $\Delta > 0$ ✓

$x_1 = \frac{-1 - \sqrt{49}}{2.1} = \frac{-1-7}{2} = \frac{-8}{2} = -4$ //

$x_2 = \frac{-1 + \sqrt{49}}{2.1} = \frac{-1+7}{2} = \frac{6}{2} = 3$ // ✓

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a}$ $S = \{-4, 3\}$ $x_1 = -4$, $x_2 = +3$ //

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l) $2x = 15 - x^2 \Rightarrow x^2 + 2x - 15 = 0$

	$\Delta = b^2 - 4.a.c$
$a = 1$	$\Delta = 2^2 - 4.1.(-15)$
$b = 2$	$\Delta = 4 + 60$
$c = -15$	$\Delta = 64$, $\Delta > 0$

$x_1 = \frac{-2 - \sqrt{64}}{2.1} = \frac{-2-8}{2} = \frac{-10}{2} = \frac{-5}{1} = -5$ //

$x_2 = \frac{-2 + \sqrt{64}}{2.1} = \frac{-2+8}{2} = \frac{6}{2} = 3$ // ✓

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a}$

$S = \{-5, 3\}$ $x_1 = -5$, $x_2 = +3$ //

*Esse descobri no algoritmo em C++ ☺ OK