

data
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D S Q O S S
D L M M J V S

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Lista de Exercícios - Matemática 1 - Semana 6

1) Simplificar as frações

a) $\frac{96}{36} = \frac{8}{3}$ b) $\frac{24}{18} = \frac{4}{3}$ c) $\frac{12}{48} = \frac{1}{4}$ d) $\frac{30}{24} = \frac{5}{4}$ e) $\frac{42}{16} = \frac{21}{8}$

96, 36 (2)	24, 18 (2)	12, 48 (2)	30, 24 (2)	42, 16 (2)
48, 18 (2)	12, 9 (2)	6, 24 (2)	15, 12 (2)	21, 8 (2)
24, 9 (2)	6, 9 (2)	3, 12 (2)	15, 6 (2)	21, 4 (2)
12, 9 (2)	3, 9 (3)	3, 6 (2)	15, 3 (3)	21, 2 (2)
6, 9 (2)	1, 3 (3)	3, 3 (3)	5, 1 (5)	21, 1 (3)
3, 9 (3)	1, 1 (6)	1, 1 (12)	1, 1 (6)	7, 1 (7)
1, 3 (3)				1, 1 (2)
1, 1 (12)				

f) $\frac{33}{15} = \frac{11}{5}$ g) $\frac{24}{12} = \frac{2}{1}$ h) $\frac{30}{30} = \frac{1}{1}$ i) $\frac{12}{24} = \frac{1}{2}$

33, 15 (3)	24, 12 (2)	30, 30 (2)	12, 24 (2)
11, 5 (5)	12, 6 (2)	15, 15 (3)	6, 12 (2)
11, 1 (11)	6, 3 (2)	5, 5 (5)	3, 6 (2)
1, 1 (3)	3, 3 (3)	1, 1 (30)	3, 3 (3)
	1, 1 (12)		1, 1 (12)

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

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:



$$a) \frac{4}{15} - \frac{2 \cdot 9}{3 \cdot 10} = \frac{4}{15} - \frac{18}{30} = \frac{4}{15} - \frac{3}{5} = 15, 5 \cdot 3, 18, 30 \text{ (2)}$$

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

$$5, 5 \cdot 5, 9, 15 \text{ (3)}$$

$$1, 1 \cdot 15, 3, 5 \cdot 3$$

$$1, 1 \cdot 6$$

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

$$2, 6 \cdot 2, 8, 4 \cdot 2,$$

$$1, 3 \cdot 3, 4, 2 \cdot 2,$$

$$= \frac{7}{16} \div \frac{14}{12} = \frac{7}{16} \div \frac{7}{6} = \frac{7}{16} \times \frac{6}{7} = \frac{42}{112} = 1, 1 \cdot 12, 2, 1 \cdot 2,$$

$$1, 1 \cdot 16,$$

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

$$42, 112 \text{ (2)}$$

$$21, 56 \cdot 2$$

$$21, 28 \cdot 2$$

$$21, 14 \cdot 2$$

$$21, 7 \cdot 3$$

$$7, 7 \cdot 7$$

$$1, 1 \cdot 14,$$

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

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

$$1, 3 \cdot 3, 9, 3 \cdot 3,$$

$$1, 1 \cdot 3,$$

$$3, 1 \cdot 3,$$

$$1, 1 \cdot 9,$$

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

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

$$\left(\frac{1+1}{1 \cdot 4} \right) \cdot \frac{5}{3} = \left(\frac{2}{4} \right) \cdot \frac{5}{3} = \frac{10}{12} = \frac{5}{6}$$

$$6, 9 \cdot 2, 7, 42 \cdot 2$$

$$3, 9 \cdot 3, 7, 21 \cdot 3$$

$$1, 3 \cdot 3, 7, 7 \cdot 7$$

$$1, 1 \cdot 18, 1, 1 \cdot 7,$$

$$= \left(-\frac{1}{2} \cdot \frac{4}{5} \right) \cdot \frac{5}{3} = \left(-\frac{4}{10} \right) \cdot \frac{5}{3} = \left(-\frac{2}{5} \right) \cdot \frac{5}{3} = -\frac{10}{15} = -\frac{2}{3}$$

$$40, 10 \text{ (2)}$$

$$20, 5 \cdot 2$$

$$10, 5 \cdot 2$$

$$5, 5 \cdot 5$$

$$1, 1 \cdot 10,$$

3) Resolver as equações de segundo grau dadas por:

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

	$\Delta = b^2 - 4.a.c$	$X_1 = \frac{3 - \sqrt{49}}{2.5} = \frac{3 - 7}{10} = \frac{-4}{10} = -\frac{2}{5}$
$a = 5$	$\Delta = (-3)^2 - 4.5.(-2)$	
$b = -3$	$\Delta = 9 + 40$	
$c = -2$	$\Delta = +49, \Delta > 0$	$X_2 = \frac{3 + \sqrt{49}}{2.5} = \frac{3 + 7}{10} = \frac{10}{10} = 1$

$X_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2.a}$ $S = \left\{ -\frac{2}{5}, 1 \right\}$ $X_1 = -2/5, X_2 = 1$

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

	$\Delta = b^2 - 4.a.c$	$S = \{ \emptyset \}, x \notin \mathbb{R}$
$a = 3$	$\Delta = 0 - 4.3.55$	
$b = 0$	$\Delta = 0 - 660$	+ Pelo delta ser menor que 0,
$c = 55$	$\Delta = -660, \Delta < 0$	não existe raiz real p/ essa equação.

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

	$\Delta = b^2 - 4.a.c$	$X_{1,2} = \frac{10 \pm \sqrt{\Delta}}{2.a} = \frac{10 \pm 0}{2.1} = \frac{10}{2} = +5$
$a = 1$	$\Delta = (-10)^2 - 4.1.25$	
$b = -10$	$\Delta = 100 - 100$	
$c = 25$	$\Delta = 0$	$S = \{ +5, +5 \}$ $X_1 = +5, X_2 = +5$

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

	$\Delta = b^2 - 4.a.c$	$X_1 = \frac{6 \pm \sqrt{36}}{2.1} = \frac{6 - 6}{2} = \frac{0}{2} = 0$
$a = 1$	$\Delta = (-6)^2 - 4.1.0$	
$b = -6$	$\Delta = 36 - 0$	
$c = 0$	$\Delta = 36, \Delta > 0$	$X_2 = \frac{6 + \sqrt{36}}{2.1} = \frac{6 + 6}{2} = \frac{12}{2} = 6$

$X_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2.a}$ $S = \{ 0, 6 \}$ $X_1 = 0, X_2 = 6$

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

$a = 1$ $\Delta = b^2 - 4 \cdot a \cdot c$

$b = -1$ $\Delta = (-1)^2 - 4 \cdot 1 \cdot (-20)$

$c = -20$ $\Delta = 1 + 80$

$\Delta = 81, \Delta > 0$

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

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

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a}$ $S = \{-4, 5\}$

$x_1 = -4, x_2 = 5$

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

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

$a = 1$ $\Delta = (-8)^2 - 4 \cdot 1 \cdot 7$

$b = -8$ $\Delta = 64 - 28$

$c = 7$ $\Delta = 36, \Delta > 0$

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

$x_2 = \frac{8 + \sqrt{36}}{2 \cdot 1} = \frac{8 + 6}{2} = \frac{14}{2} = 7$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a}$ $S = \{1, 7\}$

$x_1 = +1, x_2 = +7$

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

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

$a = 3$ $\Delta = (-15)^2 - 4 \cdot 3 \cdot 12$

$b = -15$ $\Delta = 225 - 144$

$c = 12$ $\Delta = 81, \Delta > 0$

$x_1 = \frac{15 - \sqrt{81}}{2 \cdot 3} = \frac{15 - 9}{6} = \frac{6}{6} = 1$

$x_2 = \frac{15 + \sqrt{81}}{2 \cdot 3} = \frac{15 + 9}{6} = \frac{24}{6} = 4$

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a}$ $S = \{1, 4\}$

$x_1 = +1, x_2 = +4$

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

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

$a = 1$ $\Delta = (-5)^2 - 4 \cdot 1 \cdot 6$

$b = -5$ $\Delta = 25 - 24$

$c = 6$ $\Delta = 1, \Delta > 0$

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

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

$x_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a}$ $S = \{2, 3\}$

$x_1 = 2, x_2 = 3$

i) $2x^2 - 7x = 15$ $\Rightarrow 2x^2 - 7x - 15 = 0$ $X_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a}$ $S = \left\{ -\frac{3}{2}, 5 \right\}$ $X_1 = -\frac{3}{2}, X_2 = 5$

$a = 2$	$\Delta = b^2 - 4.a.c$	$X_1 = \frac{7 - \sqrt{169}}{2.2} = \frac{7 - 13}{4} = \frac{-6}{4} = -\frac{3}{2}$
$b = -7$	$\Delta = (-7)^2 - 4.2.(-15)$	
$c = -15$	$\Delta = 49 + 120$	
	$\Delta = 169, \Delta > 0$	$X_2 = \frac{7 + \sqrt{169}}{2.2} = \frac{7 + 13}{4} = \frac{20}{4} = 5 = S_1 = S_2$

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

$a = 4$	$\Delta = b^2 - 4.a.c$	$X_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a} = X_{(1,2)} = \frac{12 \pm 0}{2.4} =$
$b = -12$	$\Delta = (-12)^2 - 4.4.9$	
$c = 9$	$\Delta = 144 - 144$	
	$\Delta = 0$	$X_1 = X_2 = \frac{12}{8} = \frac{3}{2}$
$S = \left\{ \frac{3}{2}, \frac{3}{2} \right\}$		

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

$a = 2$	$\Delta = b^2 - 4.a.c$	$X_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a} = \frac{-12 \pm 0}{2.2} = \frac{-12}{4} =$
$b = 12$	$\Delta = 12^2 - 4.2.18$	
$c = 18$	$\Delta = 144 - 144$	
	$\Delta = 0$	$X_1 = X_2 = \frac{-12}{4} = -3$
$S = \{-3\}$		

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

$a = 1$	$\Delta = b^2 - 4.a.c$	$X_1 = \frac{-2 - \sqrt{64}}{2.1} = \frac{-2 - 8}{2} = \frac{-10}{2} = -5$
$b = 2$	$\Delta = 2^2 - 4.1.(-15)$	
$c = -15$	$\Delta = 4 + 60$	
	$\Delta = 64, \Delta > 0$	$X_2 = \frac{-2 + \sqrt{64}}{2.1} = \frac{-2 + 8}{2} = \frac{6}{2} = 3$
$X_{(1,2)} = \frac{-b \pm \sqrt{\Delta}}{2.a}$		$S = \{-5, 3\}$
		$X_1 = -5, X_2 = 3$

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

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

$S = \{-3\}$

$x^2 + 6x + 9 = 0$

$a = 1 \quad \Delta = b^2 - 4 \cdot a \cdot c$

$b = 6 \quad \Delta = 6^2 - 4 \cdot 1 \cdot 9$

$c = 9 \quad \Delta = 36 - 36$

$\Delta = 0$

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

$= \frac{-6 \pm 0}{2} = \frac{-6}{2} = -3, \quad X_1 = X_2 = -3$

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

$a = 1 \quad \Delta = b^2 - 4 \cdot a \cdot c$

$b = 1 \quad \Delta = 1^2 - 4 \cdot 1 \cdot (-12)$

$c = -12 \quad \Delta = 1 + 48$

$\Delta = 49, \Delta > 0$

$X_1 = \frac{-1 \pm \sqrt{49}}{2 \cdot 1} = \frac{-1 - 7}{2} = \frac{-8}{2} = -4$

$X_2 = \frac{-1 \pm \sqrt{49}}{2 \cdot 1} = \frac{-1 + 7}{2} = \frac{6}{2} = 3$

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

$S = \{-4, 3\}$

$X_1 = -4, X_2 = +3$

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

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

$a = 1 \quad \Delta = 2^2 - 4 \cdot 1 \cdot (-15)$

$b = 2 \quad \Delta = 4 + 60$

$c = -15 \quad \Delta = 64, \Delta > 0$

$X_1 = \frac{-2 \pm \sqrt{64}}{2 \cdot 1} = \frac{-2 - 8}{2} = \frac{-10}{2} = -5$

$X_2 = \frac{-2 \pm \sqrt{64}}{2 \cdot 1} = \frac{-2 + 8}{2} = \frac{6}{2} = 3$

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

$S = \{-5, 3\}$

$X_1 = -5, X_2 = +3$

*Esse descobri no algoritmo em C++ !!