

Lectia 13

1. a) $15 + 43 - 27 = 58 - 27 = 31$

b) $413 - 395 + 11 = 18 + 11 = 29$

c) $642 + 423 - 999 = 1065 - 999 = 66$

d) $725 - 696 + 37 = 29 + 37 = 66$

e) $2138 - 809 + 57 = 1329 + 57 = 1386$

f) $521 - 99 + 17 - 47 = 422 + 17 - 47 = 439 - 47 = 392$

2. a) $22 \cdot 2 : 11 = 44 : 11 = 4$

b) $360 : 10 \cdot 6 = 36 \cdot 6 = 216$

c) $3^2 \cdot 8 : 12 \cdot 13 : 39 = 9 \cdot 8 : 12 \cdot 13 : 39 = 72 : 12 \cdot 13 : 39 =$
 $= 6 \cdot 13 : 39 = 78 : 39 = 2$

d) $5 \cdot 12 \cdot 17 : 255 = 60 \cdot 17 : 255 = 1020 : 255 = 4$

e) $12 \cdot 11 : 44 \cdot 16 : 24 = 132 : 44 \cdot 16 : 24 = 3 \cdot 16 : 24 = 48 : 24 = 2$

f) $456 : 24 \cdot 5^2 : 19 \cdot 20 = 19 \cdot 25 : 19 \cdot 20 = 475 : 19 \cdot 20 =$
 $= 25 \cdot 20 = 500$

3. a) $10^{60} : (2 \cdot 5)^{58} = 10^{60} : 10^{58} = 10^{60-58} = 10^2 = 100$

b) $(7^{14} \cdot 5)^2 : 7^{26} = (7^{14})^2 \cdot 5^2 : 7^{26} = 7^{28} \cdot 5^2 : 7^{26} = 7^{28-26} \cdot 5^2 =$
 $= 7^2 \cdot 5^2 = 49 \cdot 25 = 1225$

c) $(7^6)^8 : 49^{24} = 7^{6 \cdot 8} : (7^2)^{24} = 7^{48} : 7^{2 \cdot 24} = 7^{48} : 7^{48} = 7^{48-48} = 7^0 = 1$

d) $(3^4)^9 : (9^6)^3 = 3^{4 \cdot 9} : 9^{6 \cdot 3} = 3^{36} : (3^2)^{18} = 3^{36} : 3^{2 \cdot 18} =$
 $= 3^{36} : 3^{36} = 3^{36-36} = 3^0 = 1$

e) $(11^{2011} \cdot 4^{1005}) : [(22^2)^5]^{201} = (11^{2011} \cdot 4^{1005}) : 22^{2 \cdot 5 \cdot 201} =$
 $= (11^{2011} \cdot 4^{1005}) : (2 \cdot 11)^{2010} = [11^{2011} \cdot (2^2)^{1005}] : (2^{2010} \cdot 11^{2010}) =$
 $= (11^{2011} \cdot 2^{2010}) : (2^{2010} \cdot 11^{2010}) = 11^{2011-2010} \cdot 2^{2010-2010} =$
 $= 11^1 \cdot 2^0 = 11 \cdot 1 = 11$

$$\Delta) 2^{23} : 2^{21} : 2 + 3^{32} : 3^{31} \cdot 3 = 2^{23-21-1} + 3^{32-31+1} = 2^1 + 3^2 = 2 + 9 = 11$$

$$4. a) (7503 : 61 + 877) : 500 + 53 \cdot 11 = (123 + 877) : 500 + 583 = 1000 : 500 + 583 = 2 + 583 = 585$$

$$b) 207 \cdot 9 - (19^2 + 3^2) : 74 + 2296 : 41 = 1863 - (361 + 9) : 74 + 56 = 1863 - 370 : 74 + 56 = 1863 - 5 + 56 = 1858 + 56 = 1914$$

$$c) 5 \cdot 230 - 7 \cdot (512 : 32 + 2^2) + 4687 : 43 = 1150 - 7 \cdot (16 + 4) + 109 = 1150 - 7 \cdot 20 + 109 = 1150 - 140 + 109 = 1010 + 109 = 1119$$

$$d) [493 : 17 - (128 : 2^3 + 224 : 8) : 22] : 27 - 1 = [29 - (128 : 8 + 28) : 22] : 27 - 1 = [29 - (16 + 28) : 22] : 27 - 1 = (29 - 44 : 22) : 27 - 1 = (29 - 2) : 27 - 1 = 27 : 27 - 1 = 1 - 1 = 0$$

$$5. a) 10 \cdot \{ 18^2 : 324 + 2 \cdot [(2^2 \cdot 3)^{15} : (2^{29} \cdot 3^{15}) + 1^{24}] \} = 10 \cdot \{ 324 : 324 + 2 \cdot [(2^{2 \cdot 15} \cdot 3^{15}) : (2^{29} \cdot 3^{15}) + 1] \} = 10 \cdot [1 + 2 \cdot (2^{30-29} \cdot 3^{15-15} + 1)] = 10 \cdot [1 + 2 \cdot (2 \cdot 3^0 + 1)] = 10 \cdot [1 + 2 \cdot (2 \cdot 1 + 1)] = 10 \cdot (1 + 2 \cdot 3) = 10 \cdot 7 = 70$$

$$b) [2^{12} \cdot 2^{18} + 5^{70} : 5^{10} - (3^{25})^2] : [4^2 \cdot 2^3 \cdot 2^{23} + (5^{15})^2 - (3^2)^5] = (2^{12+18} + 5^{70-10} - 3^{25 \cdot 2}) : [(2^2)^2 \cdot 2^{3+23} + (5^{15})^2 - 3^{2 \cdot 25}] = (2^{30} + 5^{60} - 3^{50}) : (2^{4+26} + 5^{15 \cdot 2} - 3^{50}) = (2^{30} + 5^{60} - 3^{50}) : (2^{30} + 5^{60} - 3^{50}) = (2^{30} + 5^{60} - 3^{50})^{1-1} = (2^{30} + 5^{60} - 3^{50})^0 = 1$$

$$6. \quad a = 6 + 8 \cdot [32 : 4 - 5 \cdot (4^3 - 7 \cdot 3^2)]$$

$$a = 6 + 8 \cdot [8 - 5 \cdot (64 - 7 \cdot 9)]$$

$$a = 6 + 8 \cdot [8 - 5 \cdot (64 - 63)]$$

$$a = 6 + 8 \cdot (8 - 5 \cdot 1)$$

$$a = 6 + 8 \cdot (8 - 5)$$

$$a = 6 + 8 \cdot 3$$

$$a = 6 + 24$$

$$a = 30$$

$$b = 15 \cdot 2 + (256 : 16 + 4) : 5 + 2121 : 21$$

$$b = 30 + (16 + 4) : 5 + 101$$

$$b = 30 + 20 : 5 + 101$$

$$b = 30 + 4 + 101$$

$$b = 135$$

$135 - 30 - 1 = 104$ numere naturale sunt între a și b

$$7. \quad a) \quad 5 \cdot (4 : 2 + 8) - 2 = 48$$

$$b) \quad 6 \cdot (9 : 3 + 5 - 2) = 36$$

$$c) \quad 3 \cdot (8 : 4 + 6 \cdot 2) - 18 = 24$$

8. x = suma de bani aruță de Andrei la început

$$x + 75 + 40 - 80 = 400 \Rightarrow x + 115 - 80 = 400 \Rightarrow x = 400 - 35 \Rightarrow$$

$$\Rightarrow x = 365 \text{ lei}$$

$$9. a = ?$$

$$(\overline{abcde} - 100 \cdot \overline{bc} - \overline{de}) : 10^4 = 7$$

$$\overline{abcde} - 100 \cdot \overline{bc} - \overline{de} = 7 \times 10^4$$

$$a \cdot 10000 + b \cdot 1000 + c \cdot 100 + d \cdot 10 + e - 100 \cdot (b \cdot 10 + c) - d \cdot 10 - e = 70000$$

$$a \cdot 10000 + b \cdot 1000 + c \cdot 100 + d \cdot 10 + e - b \cdot 1000 - c \cdot 100 - d \cdot 10 - e = 7 \cdot 10000 \Rightarrow a = 7$$

$$b - b = 0 \Rightarrow 0 = 0$$

$$c - c = 0 \Rightarrow 0 = 0.$$

$$R: a = 7$$

$$10. a + b + c = ?$$

$$a) \overline{ab} + \overline{bc} + \overline{ca} = 88$$

$$\underline{a} \cdot 10 + \underline{b} + \underline{b} \cdot 10 + \underline{c} + \underline{c} \cdot 10 + \underline{a} = \underline{8} \cdot 10 + \underline{8} \Rightarrow$$

$$\Rightarrow a + b + c = 8$$

$$c) \overline{abc} + \overline{cab} + \overline{bca} = 777$$

$$\underline{a} \cdot 100 + \underline{b} \cdot 10 + \underline{c} + \underline{c} \cdot 100 + \underline{a} \cdot 10 + \underline{b} + \underline{b} \cdot 100 + \underline{c} \cdot 10 + \underline{a} = \underline{7} \cdot 100 + \underline{7} \cdot 10 + \underline{7} \Rightarrow$$

$$\Rightarrow a + c + b = 7 \Rightarrow a + b + c = 7$$

$$d) \overline{ab} + \overline{ac} + \overline{ba} + \overline{bc} + \overline{ca} + \overline{cb} = 110$$

$$\underline{a} \cdot 10 + \underline{b} + \underline{a} \cdot 10 + \underline{c} + \underline{b} \cdot 10 + \underline{a} + \underline{b} \cdot 10 + \underline{c} + \underline{c} \cdot 10 + \underline{a} + \underline{c} \cdot 10 + \underline{b} = 1 \cdot 100 + 1 \cdot 10$$

$$\Rightarrow (2a + 2b + 2c) \cdot 10 + (2a + 2b + 2c) = 110 \rightarrow 2(a + b + c) \cdot 10 + 2(a + b + c) = 110 \Rightarrow$$

$$\Rightarrow 2[(a + b + c) \cdot 10 + (a + b + c)] = 110 \Rightarrow$$

$$\Rightarrow (a + b + c) \cdot 10 + (a + b + c) = 110 : 2 \Rightarrow$$

$$\Rightarrow (a + b + c) \cdot 10 + (a + b + c) = 55 \Rightarrow$$

$$\Rightarrow a + b + c = 5$$

$$b) \overline{ab} + \overline{bc} + \overline{ca} = \overline{abc}$$

$$a \cdot 10 + b + b \cdot 10 + c + c \cdot 10 + a = a \cdot 100 + b \cdot 10 + c$$

$$11a + 11b + 11c = 100a + 10b + c$$

$$100a - 11a = 11b - 10b + 11c - c$$

$$89 \cdot a = b + 10 \cdot c$$

$$a = 1 \Rightarrow 89 = 10 \cdot c + b \Rightarrow 8 \cdot 10 + 9 = 10 \cdot c + b \Rightarrow c = 8 \text{ ; } b = 9$$

$$a + b + c = 1 + 8 + 9 = 18$$

$$a = 2 \Rightarrow 89 \cdot 2 = 10 \cdot c + b \Rightarrow 178 = 10 \cdot c + b \Rightarrow \text{nu se poate}$$

Minitest

1. a) $879 + 363 : 11 - 25 \cdot 36 = 879 + 33 - 900 = 912 - 900 = 12$
b) $16 \cdot 16 - 975 : 75 - 9 \cdot 27 = 256 - 13 - 243 = 243 - 243 = 0$
c) $15 \cdot 18 - 490 : 70 - 261 = 270 - 7 - 261 = 263 - 261 = 2$
d) $56 \cdot 72 : 126 + 222 - 88 = 4032 : 126 + 134 = 32 + 134 = 166$

$$2. A = (25^3)^9 : (4^2 + 3^2)^{26} - (2017^0 + 0^{2017} + 1^{2017})^4$$

$$A = 25^{3 \cdot 9} : (16 + 9)^{26} - (1 + 0 + 1)^4$$

$$A = 25^{27} : 25^{26} - 2^4 = 25^{27-26} - 16 = 25 - 16$$

$$A = 9$$

$$B = 2^7 - 11 \cdot \left\{ 91 - 5 \left[22 - 5 \cdot (40^2 - 41 \cdot 39) \right] \right\} + (3^2 - 2^3)^{2017}$$

$$B = 2^7 - 11 \cdot \left\{ 91 - 5 \left[22 - 5 \cdot (1600 - 1599) \right] \right\} + (9 - 8)^{2017}$$

$$B = 2^7 - 11 \cdot \left[91 - 5 \left(22 - 5 \cdot 1 \right) \right] + 1^{2017}$$

$$B = 2^7 - 11 \cdot (91 - 5 \cdot 17) + 1$$

$$B = 2^7 - 11 \cdot (91 - 85) + 1$$

$$B = 2^7 - 11 \cdot 6 + 1$$

$$B = 128 - 66 + 1$$

$$B = 62 + 1$$

$$B = 63$$

$$A < B$$

3. $(828 - 12 \cdot 24) : 18 = (828 - 288) : 18 = 540 : 18 = 30$ cutii mari