

Контрольная работа №1
 Системы счисления
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 Вариант 3

$$1) A = 1111111_2 = 255_{10}$$

$$1111111_2 = 1 \cdot 2^7 + 1 \cdot 2^6 + 1 \cdot 2^5 + 1 \cdot 2^4 + 1 \cdot 2^3 + 1 \cdot 2^2 + 1 \cdot 2^1 + 1 \cdot 2^0 = 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 = 255_{10}$$

$$B = 1116_8 = 590_{10}$$

$$1116_8 = 1 \cdot 8^3 + 1 \cdot 8^2 + 1 \cdot 8^1 + 6 \cdot 8^0 = 512 + 64 + 8 + 6 = 590_{10}$$

$$C = 22 D_{16} = 554_{10}$$

$$22 D_{16} = 2 \cdot 16^2 + 2 \cdot 16^1 + 13 \cdot 16^0 = 512 + 32 + 13 = 555_{10}$$

$$2) (A + (B - D) - E) \cdot 10_2$$

$$(1111111_2 + (1116_8 - 149_{10}) - 118_{10}) =$$

$$(255_{10} + (590_{10} - 149_{10}) - 118_{10}) = 955_{10} + 391_{10} - 118_{10} = 1228_{10}$$

$$2) (A + (B - D) - E) \cdot 10_2 = 10000100000_2 = 10560_{10}$$

$$(255_{10} + (590_{10} - 149_{10}) - 118_{10}) \cdot 10_2 = (955_{10} + 391_{10} - 118_{10}) \cdot 10_2 = 1228_{10} \cdot 10_2 = 12280_{10}$$

$$= 528_{10} = 10_2 = 528_{10} (1 \cdot 2^9 + 0 \cdot 2^8 + \dots) = 528_{10} 2_{10} =$$

$$= 1056_{10} = 10000100000_2$$

1156	2
578	2
289	2
144	2
72	2
36	2
18	2
9	2
4	2
2	2
1	2

$$3) F = 15,5_{10} = 1111,1_2$$

15	2
7	2
3	2
1	2

0	5
2	2
1	0

$$15_{10} = 1111_2$$

$$0,5_{10} = 0,1_2$$

$$1111_2 + 0,1_2 = 1111,1_2$$

$$G = 11,88_{10} = 1011,1110001010$$

11	2
5	2
2	2
1	2

$$11_{10} = 1011_2$$

0	88
.	2
1	46
	2
1	32
	2
1	16
	2
0	8
	2
0	4
	2
0	2
	2
0	1
	2
0	0.5
	2
0	0.25
	2

$$M = 11,24_{10} = 1011,0011101011_2$$

11	9
-10	5
1	-4
	2
	2
	0
	1

$$11_{10} = 1011_2$$

0	24
.	2
0	12
	2
0	6
	2
1	3
	2
1	1.5
	2
1	0.75
	2
1	0.375
	2
1	0.1875
	2
0	0.09375
	2
1	0.046875
	2
0	0.0234375
	2
1	0.01171875
	2
1	0.005859375
	2
1	0.0029296875
	2

$$0.88_{10} = 0.11100001010_2$$

$$1011_2 + 0.11100001010_2 = 1011.1100001010_2$$

$$0.24_{10} = 0.0011101011_2$$

$$1011_2 + 0.0011101011_2 = 1011.0011101011_2$$

$$F+G = 1011.1100001010_2 + 1011.0011101011_2$$

$$= 11011.01100001_2 = 24,34890625_{10}$$

$$+1 \cdot 2^0 + 0 \cdot 2^{-1} + 1 \cdot 2^{-2} + 1 \cdot 2^{-3} + 0 \cdot 2^{-4} + 0 \cdot 2^{-5} + 0 \cdot 2^{-6} +$$

$$70 + 0 + 0 + 0 + 0.00390625 = 27.34890625_{10}$$

$$F_1G = 1101.01100001_2 = 27,37890625_{10}$$

$$(H.G)_b = 1011.0011101011_2 \cdot 1011.1100001010_2 =$$

$$= 11,24_{10} \cdot 11,88_{10} = 133,5312_{10} = 10000101,1000011111_V$$

$$\begin{array}{r} 133 \overline{) 132} \quad 2 \\ \underline{132} \\ 0 \end{array} \quad \begin{array}{r} 33 \overline{) 33} \quad 2 \\ \underline{33} \\ 0 \end{array} \quad \begin{array}{r} 66 \overline{) 66} \quad 2 \\ \underline{66} \\ 0 \end{array} \quad \begin{array}{r} 8 \overline{) 8} \quad 2 \\ \underline{8} \\ 0 \end{array} \quad \begin{array}{r} 4 \overline{) 4} \quad 2 \\ \underline{4} \\ 0 \end{array} \quad \begin{array}{r} 2 \overline{) 2} \quad 2 \\ \underline{2} \\ 0 \end{array}$$

0,5312

4 2

1, 2624

[illegible]

10	2496
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$$\frac{0}{1} \quad \frac{2}{1}$$

0	5	5	8	1
				2

17	9968
	2

9.9 86

7	55	56
		2

9872

7	9
1	14

7	9	4	4	7
				2

1	9488
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7		2
<hr/>		
	22	940

8 576
2

$$133_{10} = 10000101_2$$

$$0.53120000000001_2 = 0.1000011111_2$$

$$0.000101_2 + 0.100011111_2 =$$

$= 10000 \text{ 101}, 10000 \text{ 111112}$

9968
~~9968~~
2

$$(H, G)_2 = 1011.0011101011_2 \cdot 1011.1110001010_2 = 10000101.100001101110000101110_2 = 133.526866436_{10}$$

[illegible]

$$\begin{aligned}
 & 1.0000101.1000011011400000101110_2 = 1 \cdot 2^9 + 0.2^6 + 0.2^5 + \\
 & + 0.2^4 + 0.2^3 + 1 \cdot 2^2 + 0.2^1 + 1 \cdot 2^0 + 1 \cdot 2^{-1} + 0.2^{-3} + 0.2^{-4} + \\
 & + 0.2^{-5} + 1 \cdot 2^{-6} + 1 \cdot 2^{-7} + 0.2^{-8} + 1 \cdot 2^{-9} + 1 \cdot 2^{-9} + 1 \cdot 2^{-10} + \\
 & + 1 \cdot 2^{-10} + 1 \cdot 2^{-11} + 0.2^{-12} + 0.2^{-13} + 0.2^{-14} + 0.2^{-15} + 0.2^{-16} + \\
 & + 1 \cdot 2^{-17} + 0.2^{-18} + 1 \cdot 2^{-19} + 1 \cdot 2^{-20} + 1 \cdot 2^{-21} + 0.2^{-22} = \\
 & = 133.526866436_{10}
 \end{aligned}$$

$$(M.G)_{10} = 11.24_{10} \cdot 11.88_{10} = 133,5312$$

$$(M.G)_{10} > (M.G)_2$$

$$4) E_{10} = 118, I_{10} = 89$$

$$E_{10} = 118$$

$$\begin{array}{r|rr} 118 & 2 & \\ \hline 118 & 59 & 2 \\ \hline 0 & -58 & \\ & 1 & -29 & 2 \\ & & 14 & 2 \\ & & -14 & 7 & 2 \\ & & 0 & -6 & 3 & 2 \\ & & & 1 & -2 & 1 \end{array}$$

$$E_2 = 1110110_2$$

$$I_{10} = 89$$

$$\begin{array}{r|rr} 89 & 2 & \\ \hline 88 & 44 & e \\ \hline 1 & -44 & 22 & 2 \\ & 0 & -22 & 11 & 2 \\ & & 0 & -10 & 5 & 2 \\ & & & 1 & -4 & 2 & 2 \\ & & & & 1 & -2 & 1 \end{array}$$

$$I_2 = 1011001_2$$

$$E_2 \cdot I_2 = 1110110 \cdot 1011001 =$$

$$= 10100100000110_2$$

$$\begin{array}{r} 1110110 \\ 1011001 \\ \hline 1110110 \\ 0000000 \\ 0000000 \\ 1110110 \\ 1110110 \\ 0000000 \\ 1110110 \\ \hline 10100100000110 \end{array}$$

$$\begin{aligned}
 (E \cdot I)_{10} &= 1 \cdot 2^{13} + 0 \cdot 2^{12} + 1 \cdot 2^{11} + 0 \cdot 2^{10} + 0 \cdot 2^9 + 1 \cdot 2^8 + 0 \cdot 2^7 + \\
 &+ 0 \cdot 2^6 + 0 \cdot 2^5 + 0 \cdot 2^4 + 0 \cdot 2^3 + 1 \cdot 2^2 + 1 \cdot 2^1 + 0 \cdot 2^0 = \\
 &= 8192 + 0 + 2048 + 0 + 0 + 256 + 0 + 0 + 0 + 0 + 4 + 2 + 0 = \\
 &= 10502_{10}
 \end{aligned}$$

$$(E \cdot I)_{10} = 10502_{10}$$

$$\begin{array}{r|rr}
 (E \cdot I)_{16} = & 10502 & 16 \\
 - & 10496 & 656 \\
 \hline
 & 6 & 16 \\
 & & -656 & 41 & 16 \\
 & & 0 & -32 & 2 \\
 & & & \hline
 & & & & 9
 \end{array}$$

$$(E \cdot I)_{16} = 2906_{16}$$

$$E_{10} \cdot I_{10} = 118.89 = 10502$$

$$(E \cdot I)_{10} = E_{10} \cdot I_{10} \Rightarrow (E \cdot I)_{10} = (E \cdot I)_{10}$$

$$5) I_{10} = 1454_{10}, \quad \bar{I}_{10} = 89_{10}$$

$$\bar{I}_2 = 1011001_2$$

$$I_2 = 11011011010_2$$

$$\begin{array}{r}
 \frac{J_2}{I_2} = \frac{11011011010}{1011001} \frac{1011001}{10011.1011010} \\
 \begin{array}{r}
 10100101 \\
 - 1011001 \\
 \hline
 10011000 \\
 - 1011001 \\
 \hline
 1111110 \\
 1011001 \\
 \hline
 10010100 \\
 - 1011001 \\
 \hline
 1110110 \\
 - 1011001 \\
 \hline
 1110100 \\
 - 1011001 \\
 \hline
 1101100
 \end{array}
 \end{array}$$

$$\frac{J_2}{I_2} = 10011.101101_2$$

$$\begin{aligned}
 \left(\frac{J}{I}\right)_{10} &= 1 \cdot 2^4 + 0 \cdot 2^3 + 0 \cdot 2^2 + 1 \cdot 2^1 + 1 \cdot 2^0 + 1 \cdot 2^{-1} + 0 \cdot 2^{-2} + \\
 &+ 1 \cdot 2^{-3} + 1 \cdot 2^{-4} + 0 \cdot 2^{-5} + 1 \cdot 2^{-6} = 16 + 0 + 0 + 2 + 1 + 0.5 + 0.125 + \\
 &+ 0.125 + 0.0625 + 0 + 0.015625 = 19.703125_{10}
 \end{aligned}$$

$$\left(\frac{J}{I}\right)_{10} = 19.703125_{10}$$

$$JK = 0,0010011,1011$$

$$OK = 0,0010011,1011$$

$$DK = 0,0010011,1011$$

$$\frac{J_{10}}{I_{10}} = \frac{1759}{89} = 19, 40486516853933_{10}$$

$$JK = 0,0010011_{10}$$

$$OK = 0,0010011_{10}$$

$$OK = 0,0010011_{10}$$

Значения округляем.

$$\rightarrow E = 118, I = 89$$

$$E_{2-10} = 111000_{2-10}$$

$$I_{2-10} = 10001001_{2-10}$$

$$E_{2-10} + I_{2-10} = 111000 + 10001001_{2-10} = 11000001_{2-10}$$

$$E_{2-10} - I_{2-10} = 111000_{2-10} - 10001001_{2-10} = -1010001_{2-10}$$

$$(E_{2-10} + I_{2-10})_{10} = 301$$

$$(E_{2-10} - I_{2-10})_{10} = -121$$

$$E_{10} + I_{10} = 118 + 89 = 207$$

$$(E_{2-10} + I_{2-10})_{10} \triangleq E_{10} + I_{10}$$

$$301 \triangleq 207$$

$$E_{10} - I_{10} = 118 - 89 = 29$$

$$(E_{2-10} - I_{2-10})_{10} \triangleq E_{10} - I_{10}$$

$$-121 \triangleq 29$$

$$8) L_{10} = 163_{10}, K_{10} = 148_{10}$$

$$L_2 = 10100011_2$$

$$K_2 = 10110010_2$$

$$OK_L = 0,10100011$$

$$OK_K = 0,10110010$$

$$OK_L + OK_K = \begin{array}{r} 0,10100011 \\ + 0,10110010 \\ \hline 1,01010101 \end{array}$$

$$OK_L + OK_K = 1,01010101$$

$$\pi K_{L+K} = 1,10101010_2 = 1,6640625_{10}$$

$$OK_L = 0,10100011$$

$$OK_K = 0,10110010$$

$$\cancel{OK_L} - \cancel{OK_K} = OK_L - OK_K = 0,10100011 - 0,10110010 =$$

$$= -0,000111_2$$

$$\pi K_{L-K} = -0,000111 + 0,0000001 = -0,0000001_2 =$$

$$= -0,125_{10}$$

$$L+K = 163+148 = 311_{10}$$

$$(\pi K_{L+K}) \neq L+K$$

$$1,6640625_{10} \neq 311_{10}$$

$$L-K = 163 - 148 = 15$$

$$\pi K_{L-K} > L-K$$

$$-0,125_{10} > -15$$