Министерство образования и науки РФ

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«Санкт-Петербургский национальный исследовательский университет

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**факультет программной инженерии и компьютерной техники**

**ДОМАШНЯЯ РАБОТА № 7**

по дисциплине

‘Дискретная Математика’

Вариант №18

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# Пункт 1

A = 8,5

B = 0,011

## Ф1

A = 8,510 = 8,816 = 0,8816 × 161

ХА = РА + 64 = 6510 = 100 00012

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 |  |  |  |  |  | 7 | 8 |  |  |  |  |  |  |  |  |  |  | 19 |

B = 0,01110 ≈ 0,02D0E16 = 0,2D0E 16 × 16-1

ХА = РА + 64 = 6310 = 011 11112

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 |  |  |  |  |  | 7 | 8 |  |  |  |  |  |  |  |  |  |  | 19 |

## Ф2

A = 8,510 = 1000,10002 = 0,1000 10002 × 24

ХА = РА + 128 = 13210 = 1000 00002

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 |  |  |  |  |  |  |  | 8 | 9 |  |  |  |  |  |  |  |  |  | 19 |

B = 0,01110 ≈ 0,0000 0010 1101 0000 11102 = 0,1011 0100 0011 10002 × 2-6

ХА = РА + 128 = 12210 = 1000 01002

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 |  |  |  |  |  |  | 8 | 9 |  |  |  |  |  |  |  |  |  | 19 |

# Пункт 2 (4, 5)

Sign*C* = Sign*A* ⊕ Sign*B*

Sign*C* = 0

|  |  |  |  |
| --- | --- | --- | --- |
| + | XA = |  | 1 0 0 0 0 0 1 |
| XB = |  | 0 1 1 1 1 1 1 |
| XA + XB = | | 1 | 0 0 0 0 0 0 0 |
| - | |  | 1 0 0 0 0 0 0 |
| XC = | |  | 1 0 0 0 0 0 0 |

PC = 0

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| № | Операнды | СЧП (старшие разряды) | | | | | | | | | | | | | | | В/СЧП (младшие разряды) | | | | | | | | | | | | Признак коррекции |
| 0 | СЧП | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | **0** | **0** | 0 |
| 1 | MA |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | - | | | | | | | | | | | | 0 |
| СЧП →2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | **0** | **0** |
| 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | - | | | | | | | | | | | | 0 |
| СЧП →2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | **0** | **1** |
| 3 | MA | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | +A | | | | | | | | | | | | 0 |
| СЧП | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| СЧП →2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | **1** | **1** |
| 4 | MA | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -A | | | | | | | | | | | | 1 |
| СЧП | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| СЧП →2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | **0** |
| 5 | MA | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -A | | | | | | | | | | | | 1 |
| СЧП | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| СЧП →2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | **0** |
| 6 | MA | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | +A | | | | | | | | | | | | 0 |
| СЧП | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| СЧП →2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

C = (0,17E)16 \* 160 = 0,17E16 ≈ 0,0932610

∆С = СT – C = 0,0935 – 0,09326 = 0,00024

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| δС = | ∆С | \* 100% = | 0,00024 | \* 100% ≈ 0,26%, |
| СT | 0,0935 |

Погрешность полученного результата объясняется неточным представлением операндов.

# Пункт 3 (4, 5)

|  |  |  |  |
| --- | --- | --- | --- |
| + | XA = |  | 1 0 0 0 0 1 0 0 |
| XB = |  | 0 1 1 1 1 0 1 0 |
| XA + XB = | |  | 1 1 1 1 1 1 1 0 |
| - | |  | 1 0 0 0 0 0 0 0 |
| XC = | |  | 0 1 1 1 1 1 1 0 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| № | Операнды | СЧП (старшие разряды) | | | | | | | | | | | | | | | | | | В/СЧП (младшие разряды) | | | | | | | | | | | | | Признак | |
| 0 | СЧП | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 1 | 1 | 0 | 1 | 0 | 0 | **0** | **0** | **1** | **1** | 0 | |
| 4MA | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | | | | | | | | | 4A | | – А | |
| -MA | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | | | | | | | | | | | | |
| 1 | СЧП | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | |
| СЧП→4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 1 | 1 | **0** | **1** | **0** | **0** |
| 4MA | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | | | | | | | | | 4A | | 0A | |
| 0MA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | | | | | | | | | | | | |
| 2 | СЧП | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | |
| СЧП→4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | **0** | **1** | **1** |
| -4MA | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | | | | | | | | | -4A | | -A | |
| -MA | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | | | | | | | | | | | | |
| 3 | СЧП | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | |
| СЧП→4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | MA | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | | | | | | | | | | | | |  | |
| СЧП | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| 5 | 4←СЧП | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |  | | | | | | | | | | | | |  | |

C = (0,0101 1111 1011)2 \* 2-2 = 0,0001 0111 1110 11002 ≈ 0,09344510

∆С = СT – C = 0,0935 - 0,093445 = 0,000055

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| δС = | ∆С | \* 100% = | 0,000055 | \* 100% ≈ 0,0588%, |
| СT | 0,0935 |

Погрешность полученного результата объясняется неточным представлением операндов.

# Пункт 6

Точность при умножении чисел в формате Ф2 была выше из-за более высокой точности представления операндов.