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Дискретная Математика.

Задание №7

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Вариант 66

Число А = 1,1

Число В = 0,023

Число А.

А = (1,1)10 = (1,1(9))16

А = (0,11(9))16 \* 161

Характеристика числа А: ХА = РА + 64 = (65)10 = (1000001)2.Представление числа А в формате Ф1 имеет вид:

**0|1000001| 000100011001**

0 1 7 8 19

А = (1,1)10 = (1,1(9))16 = (1,0001 1001 1001)2 = (0,1000 1100 1100)16 \* 21

Характеристика числа А: ХА = РА + 128 = (129)10 = (10000001)2

Представление числа А в формате Ф2 имеет вид:

**0|10000001|00011001100**

0

19 18 11 10

Число В.

В = (0,023)10 = (0,05E35)16

В = (0,5Е35)16 \* 16-1

Характеристика числа В: ХB = РB + 64 = (63)10 = (0111111)2

Представление числа B в формате Ф1 имеет вид:

**0|0111111|010111100011**

19

0 1 7 8

В = (0,023)10 = (0,05E35)16 = (0, 0000 0101 1110 0011 0101)2 =

(0,101 1110 0011 0101)16  \* 2-5

Характеристика числа B: ХB = РB + 128 = (123)10 = (01111011)2

Представление числа B в формате Ф2 имеет вид:

**0|01111011|01111000110**

19 18 11 10 0

1. Выполнить операцию умножения операндов в формате Ф1, используя метод ускоренного умножения

мантисс на четыре разряда множителя.

**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

–

**d** 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 | 0 | | 1 | | 0 | | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | | 1 | 0 | |
| MA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |  | |  | |  | |  |  |  |  |  | +4MA | | –MA | | |
| 4MA | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |  | |  | |  | |  |  |  |  |  |  | |  | | |
| [–MA]доп | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |  | |  | |  | |  |  |  |  |  |  | |  | | |
| 1 | СЧП | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | | 1 | | 0 | | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | | 1 | 1 | |
| СЧП → 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | | 1 | | 0 | | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | | 0 |
| [–4MA]доп | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |  | |  | |  | |  |  |  |  |  | –4MA | | +2MA | | |
| +2MA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |  | |  | |  | |  |  |  |  |  |  |  |  | |  |
| 2 | СЧП | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | | 0 | | 1 | | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | | 0 | 0 | |
| СЧП → 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | | 0 | | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | | 1 |
| 4MA | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |  | |  | |  | |  |  |  |  |  | 4MA | | +2MA | | |
| +2MA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |  | |  | |  | |  |  |  |  |  |  | |  | | |
| 3 | СЧП | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | | 1 | | 0 | | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 |  | |
| СЧП → 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | | 1 | | 1 | | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | | 0 |

C = (0. 0000 0110 0111)2 =(0,067) \* 160 = 0,025146484375

CT = 0,0253

Погрешности:

ΔC =CT – C\*= 0,0253 – 0,025146484375 = 0,000153515625 — Абсолютная погрешность

δC = \* 100% ≈ 0,61% — Относительная погрешность

Погрешность полученного результата можно объяснить следующими факторами:

* неточным представлением операндов;
* потерей значащих разрядов мантиссы одного из операндов при уравнивании порядков.

2. Выполнить операцию умножения операндов в формате Ф2, используя метод ускоренного умножения мантисс на два разряда множителя.

**XA**  1 0 0 0 0 0 0 1

+

**XB** 0 1 1 1 1 0 1 1

**XA+XB** 1 1 1 1 1 1 0 0

–

**d** 1 0 0 0 0 0 0 0

**XC**  0 1 1 1 1 1 0 0 → PC = –4

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 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 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 1 | 2MA | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |  |  |  |  |  |  |  |  |  |  | +2A | | 0 |
| СЧП | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| СЧП **→** 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 2 | MA | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |  |  |  |  |  |  |  |  |  |  | +А | | 0 |
| СЧП | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| СЧП **→** 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |  |  |  |  |  | 0 | | 0 |
| СЧП | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| СЧП **→** 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| 4 | [–MA]доп | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |  |  |  |  |  |  |  |  |  |  | –А | | **1** |
| СЧП | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| СЧП **→** 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |  |  |  |  |  | 0 | | **1** |
| СЧП | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| СЧП **→** 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| 6 | [–MA]доп | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |  |  |  |  |  |  |  |  |  |  | –А | | **1** |
| СЧП | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| СЧП **→** 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| 7 | MA | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |  |  |  |  |  |  |  |  |  |  | +А | | 0 |
| СЧП | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |

C = (0.1100 1111 0011)2 \* 2-4 = (0.0000 0110 0111 1001)2 = 0,0252838

CT = 0,02528

Погрешности:

ΔC =CT – C\*= 0,0253 – 0,02528 ≈ 0,00002 — Абсолютная погрешность;

δC = \* 100% ≈ 0,079% — Относительная погрешность.

Сравнить погрешности результатов аналогичных операций для форматов Ф1 и Ф2 и объяснить причины их сходства или различия.

В формате Ф2 операнды представлены точнее и погрешность меньше.