**Домашнее задание 7. Дискретная математика.**

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**Вариант 11.**

A = 2.6

B = 0.033

**1. Формат *Ф1***

*А* = (2.6)10 = (2.(9))16 = (0.2(9))16 · 161

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |

*В* = (0.033)10 = (0.(0872B020C49BA…))16 = (0.(873))16 · 16-1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |

**2. Формат *Ф2***

*А* = (2.6)10 = (10.(1001))2 = (0.101001100110)2 · 22

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |

*В* = (0.033)10 = (0.00001000011100101011)2 = (0.100001110010)2 · 2-4

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |

**1.** **Операция умножения операндов в формате Ф1, используя метод ускоренного умножения мантисс на два разряда множителя.**

Sign*C* = Sign*A* Sign *B.*

*XA* = P*A* + *d*; *XB* = P*В* + *d*;

*XC* = *XA* + *XB* – *d;*

P*C*+ *d* = **P*A* + *d* + P*B***+ *d – d.*

P*C*

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

+

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

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

-

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

***XC*** = 1 0 0 0 0 0 0

P*C* = 0.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **N** | **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 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | **1** | **1** | 0 |
| **1** | [-M*A*]доп | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | -M*A* | | | | | | | | | | | | 1 |
| СЧП | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| СЧП > 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | **0** | **0** |
| **2** | M*A* | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | +M*A* | | | | | | | | | | | | 0 |
| СЧП | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| СЧП > 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | **1** | **1** |
| **3** | [-M*A*]доп | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | -M*A* | | | | | | | | | | | | 1 |
| СЧП | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| СЧП > 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | **0** | **1** |
| **4** | +2M*A* | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | +2M*A* | | | | | | | | | | | | 0 |
| СЧП | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| СЧП > 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | **0** | **0** |
| **5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | +0 | | | | | | | | | | | | 0 |
| СЧП | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| СЧП > 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | **1** | **0** |
| **6** | +2M*A* | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | +2M*A* | | | | | | | | | | | | 1 |
| СЧП | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| СЧП > 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| **7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | | | | | | | | | | | | 0 |
| СЧП | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| MC | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |

*С* = (0.15F)16 · 160 = (0.15F)16 = 0.085693359375

Определим абсолютную и относительную погрешности результата:

Δ*С* = 0.0858 – 0.085693359375 = -0,000106

δ*С* = · 100% = 0.124%

**2. Операция умножения операндов в формате Ф2, используя метод ускоренного умножения мантисс на четыре разряда множителя.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **N** | **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 | | 0 | | 0 | | 0 | | 1 | | | 1 | | 1 | | **0** | | **0** | | **1** | | **0** | | 0 | | |
| 0M*A* | 0 | 0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |  | | |  | |  | |  | |  | |  | | |  | |  | | 0A | | | | +2A | | | |
| 2M*A* | 0 | 0 | 0 | | 0 | | 1 | | 0 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | |  | | |  | |  | |  | |  | |  | | |  | |  | |  | |  | |  | |  | |
| **1** | СЧП | 0 | 0 | 0 | | 0 | | 1 | | 0 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | | 1 | | | 0 | | 0 | | 0 | | 0 | | 1 | | | 1 | | 1 | | 0 | | 0 | | 1 | | 0 | | 0 | | |
| СЧП > 4 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 1 | | 0 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | | 1 | | | 1 | | 0 | | 0 | | 1 | | 0 | | | 0 | | 0 | | **0** | | **1** | | **1** | | **1** | |
| 8M*A* | 0 | 0 | 1 | | 0 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | | 0 | | 0 | |  | | |  | |  | |  | |  | |  | | |  | |  | | 8A | | | | -A | | | |
| -M*A* | 1 | 1 | 1 | | 1 | | 1 | | 0 | | 1 | | 0 | | 1 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 1 | | 0 | |  | | |  | |  | |  | |  | |  | | |  | |  | |  | |  | |  | |  | |
| **2** | СЧП | 0 | 0 | 1 | | 0 | | 0 | | 1 | | 0 | | 1 | | 0 | | 0 | | 0 | | 0 | | 1 | | 0 | | 1 | | 1 | | 0 | | 1 | | | 1 | | 0 | | 0 | | 1 | | 0 | | | 0 | | 0 | | 0 | | 1 | | 1 | | 1 | | 0 | | |
| СЧП > 4 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | 1 | | 0 | | 0 | | 1 | | 0 | | 1 | | 0 | | 0 | | 0 | | 0 | | 1 | | 0 | | | 1 | | 1 | | 0 | | 1 | | 1 | | | 0 | | 0 | | **1** | | **0** | | **0** | | **0** | |
| 8M*A* | 0 | 0 | 1 | | 0 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | | 0 | | 0 | |  | | |  | |  | |  | |  | |  | | |  | |  | | 8A | | | | 0A | | | |
| 0M*A* | 0 | 0 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |  | | |  | |  | |  | |  | |  | | |  | |  | |  | |  | |  | |  | |
| **3** | СЧП | 0 | 0 | 1 | | 0 | | 1 | | 0 | | 1 | | 1 | | 1 | | 1 | | 1 | | 0 | | 1 | | 0 | | 0 | | 0 | | 1 | | 0 | | | 1 | | 1 | | 0 | | 1 | | 1 | | 0 | | | 0 | | 1 | | 0 | | 0 | | 0 | |  | | |
| СЧП > 4 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | 1 | | 0 | | 1 | | 0 | | 1 | | 1 | | 1 | | 1 | | 1 | | 0 | | 1 | | 0 | | | 0 | | 0 | | 1 | | 0 | | 1 | | | 1 | | 0 | | 1 | | 1 | | 0 | | 0 | |
| **4** |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| СЧП < 4 | 0 | 0 | | 1 | | 0 | | 1 | | 0 | | 1 | | 1 | | 1 | | 1 | | 1 | | 0 | | 1 | | 0 | | 0 | | 0 | | 1 | | |  | |  | |  | |  | |  | |  | | |  | |  | |  | |  | |  | |  | |  | |

*С* = (0.0101011111010001)2 · 2-2 = (0.000101011111010001)2 = 0.085758210.

Определим абсолютную и относительную погрешности результата:

Δ*С* = 0.0858 – 0.0857582 = 0.0000418

δ*С* = · 100% = 0.048%

Погрешности результатов вызваны неточным представлением операндов. В формате *Ф2* операнды представлены точнее и погрешность меньше.