**Дискретная математика**

Домашнее задание №7

«Умножение чисел с плавающей запятой»

Вариант №113

Выполнил: Собитов Анвархон (гр. P3115)

Варианты задания

|  |  |
| --- | --- |
| ***A*** | ***B*** |
| 8,3 | 0,044 |

Ход работы

**#1**

1. Формат *Ф1*

*А* = (8,3)10 = (8,4(C))16 = (0,84(С))16 · 161

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

*В* = (0,044)10 = (0,0B44)16 = (0,B44)16 · 16-1

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

2. Формат *Ф2*

*А* = (8,3)10 = (1000,01001100110)2 = (0,100001001100110)2 · 24

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

*В* = (0,044)10 = (0,00001011010)2 = (0,1011010)2 · 2-4

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

**#2-5**

**Ф1**

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*** = 1 0 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 | | 1 | 1 | 0 | | 1 | 0 | 0 | 0 | 1 | | 0 | 0 | 0 |
| **1** | *0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | СЧП->2 | | | | | | | | | | | | | | | 0 |
| СЧП | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 | 0 | | 1 | 0 | 0 | 0 | 1 | | 0 | 0 |
| СЧП→2 | 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** | **1** |
| **2** | *+MA* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | +M*A* | | | | | | | | | | | | | | | 0 |
| СЧП | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | | 1 | 0 | 1 | | 1 | 0 | 1 | 0 | 0 | | 0 | 1 |
| СЧП→2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | | 0 | 0 | 1 | | 0 | 1 | 1 | 0 | 1 | | **0** | **0** |
| **3** | *0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | СЧП->2 | | | | | | | | | | | | | | | 0 |
| СЧП | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | | 0 | 0 | 1 | | 0 | 1 | 1 | 0 | 1 | | 0 | 0 |
| СЧП→2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | | 0 | 1 | 0 | | 0 | 1 | 0 | 1 | 1 | | **0** | **1** |
| **4** | *+MA* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | +MA | | | | | | | | | | | | | | | 0 |
| СЧП | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | | 0 | 1 | 0 | | 0 | 1 | 0 | 1 | 1 | | 0 | 1 |
| СЧП→2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | | 1 | 1 | 0 | | 1 | 0 | 0 | 1 | 0 | | **1** | **1** |
| **5** | -MA | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | -MA | | | | | | | | | | | | | | | 1 |
| СЧП | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | | 1 | 1 | 0 | | 1 | 0 | 0 | 1 | 0 | | 1 | 1 |
| СЧП→2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | | 0 | 1 | 1 | | 1 | 0 | 1 | 0 | 0 | | **1** | **0** |
| **6** | -МA | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | -MA | | | | | | | | | | | | | | | 1 |
| СЧП | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | | 1 | 0 | 1 | | 1 | 1 | 0 | 1 | 0 | | 0 | 1 | 0 |
| СЧП→2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | | 0 | 1 | 1 | | 0 | 1 | 1 | 1 | 0 | | 1 | 0 | 0 |
| **7** | *+MA* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |  | |  |  |  | |  |  |  |  |  | |  |  |  |  |
| СЧП | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 1 | | 0 | 1 | 1 | 1 | 0 | | 1 | 0 | 0 |  |
| MC | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 1 | | 0 | 1 | 1 | 1 | 0 | | 1 | 0 | 0 |  |

*С* = (0, 5D8)16 · 160 = (0,5D8)16 = 0,365234375

Определим абсолютную и относительную погрешности результата:

*С* = 0,3652 — 0,365234375= -0,000034375

δ*С* = |*С / 0,3652*| · 100% = 0,009%

**Ф2**

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

+

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

***XA+XB*** = 1.0 0 0 0 0 0 0 0

-

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

***XC*** = 1 0 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 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | | 0 | 0 | **0** | **0** | **0** | **0** | 0 |
| 0M*A* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |  | |  |  | +0M*A* | | +0M*A* | |
| 0M*A* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |  | |  |  |  |  |  |  |
| **1** | 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 | 0 | 0 |
| СЧП→4 | 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** | **0** | **0** |
| +4M*A* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |  |  |  |  |  |  | |  |  | +4M*A* | | +0M*A* | |
| +0M*A* | 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 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| СЧП→4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | **1** | **0** | **1** | **1** |
| -4M*A* | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |  |  |  |  |  |  | |  |  | -4M*A* | | -M*A* | |
| -M*A* | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |  |  |  |  |  |  | |  |  |  |  |  |  |
| **3** | СЧП | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 1 | 1 | 0 |
| СЧП→4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| **4** | +0MA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |  | |  |  | +0MA | | +MA | |  |
| +MA | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |  |
| СЧП | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | МС | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |  |

*С* = (0,010111010101)2 · 20 = (0,010111010101)2 = 0,364502

Определим абсолютную и относительную погрешности результата:

*С* = 0,3652 – 0,364502 = 0,000698

δ*С* = (*С* / 0,3652)· 100% = 0,19%