**Дискретная математика**

Домашнее задание №8

«Деление чисел с плавающей запятой»

Вариант № 25

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Варианты задания

|  |  |
| --- | --- |
| ***A*** | ***B*** |
| 4,9 | 0,3 |

Ход работы

**#1**

1. Формат *Ф1*

*А* = (4,9)10 = (4,E(6))16 = (0,4E6)16 · 161

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

*В* = (0,3)10 = (0,4(C))16 = (0,4(C)))16 · 160

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

1. Формат *Ф2*

*А* = (4,9)10 = (100,11100110011)2 = (0,1001110011011)2 · 23

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

*В* = (0,3)10 = (0,01001100110)2 = (0,1001100110)2 · 2-1

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

**#2, 3, 5**

*XC* = *XA – XB + d*

*d* + P*C* = **P*A* + *d* – PB –d** *+ d*

**P*C***

*XC* = 1 – 0 + 64 = 65

P*C* = 1

|  |  |  |  |
| --- | --- | --- | --- |
| **N шага** | **Действие** | **Делимое** | **Частное** |
| **0** | *МА*  [-*МB*]доп  *R0*  *МА* →4  [-*МB*]доп  *R0* | **0 0 1 0 0 1 1 1 0**  **1 1 0 1 1 0 1 0 0**  **0 0 0 0 0 0 0 1 0**  **0 0 0 0 0 0 1 0 0**  **1 1 0 1 1 0 1 0 0**  **1 1 0 1 1 1 0 0 0** | **0 0 0 0 0 0 0 0**  **R0>0**  **1 1 1 0 0 0 0 0**  **1 1 1 0 0 0 0 0** |
| **1** | ←*R0*  *МB* пр  *R1* | **1 0 1 1 1 0 0 0 1**  **0 0 1 0 0 1 1 0 0**  **1 1 0 1 1 1 1 0 1** | **1 1 0 0 0 0 0 0**  **1 1 0 0 0 0 0 0** |
| **2** | ←*R1*  *МB* пр  *R2* | **1 0 1 1 1 1 0 1 1**  **0 0 1 0 0 1 1 0 0**  **1 1 1 0 0 0 1 1 1** | **1 0 0 0 0 0 0 0**  **1 0 0 0 0 0 0 0** |
| **3** | ←R2  *МB* пр  R3 | **1 1 0 0 0 1 1 1 1**  **0 0 1 0 0 1 1 0 0**  **1 1 1 0 1 1 0 1 1** | **0 0 0 0 0 0 0 0**  **0 0 0 0 0 0 0 0** |
| ***4*** | ←*R3*  *МB* пр  *R4* | **1 1 0 1 1 0 1 1 0**  **0 0 1 0 0 1 1 0 0**  **0 0 0 0 0 0 0 1 0** | **0 0 0 0 0 0 0 0**  **0 0 0 0 0 0 0 1** |
| **5** | ←*R4*  [-*МB*]доп  *R5* | **0 0 0 0 0 0 1 0 0**  **1 1 0 1 1 0 1 0 0**  **1 1 0 1 1 1 0 0 0** | **0 0 0 0 0 0 1 0**  **0 0 0 0 0 0 1 0** |
| ***6*** | ←*R*5  *МB* пр  *R6* | **1 0 1 1 1 0 0 0 0**  **0 0 1 0 0 1 1 0 0**  **1 1 0 1 1 1 1 0 0** | **0 0 0 0 0 1 0 0**  **0 0 0 0 0 1 0 0** |
| **7** | ←*R6*  *МB* пр  *R7* | **1 0 1 1 1 1 0 0 0**  **0 0 1 0 0 1 1 0 0**  **1 1 1 0 0 0 1 0 0** | **0 0 0 0 1 0 0 0**  **0 0 0 0 1 0 0 0** |
| **8** | ←*R7*  *МB* пр  *R8* | **1 1 0 0 0 1 0 0 0**  **0 0 1 0 0 1 1 0 0**  **1 1 1 0 1 0 1 0 0** | **0 0 0 1 0 0 0 0**  **0 0 0 1 0 0 0 0** |

*С\** = (1,0)16 · 161 = (10)16 = 16.

СТ = 16.33333333 (точное значение).

Определим абсолютную и относительную погрешности результата:

С = 16.3333333 – 16 = 0.333333333

δ*С* = · 100% = 2,04%

Погрешность вызвана неточным представлением операндов.

**#4, 5**

*XC* = *XA – XB + d*

*d* + P*C* = **P*A* + *d* – PB –d** *+ d*

**P*C***

*XC* = 3 – (-1) + 128 = 132

P*C* = 4

|  |  |  |  |
| --- | --- | --- | --- |
| **N шага** | **Действие** | **Делимое** | **Частное** |
| **0** | *МА*  [-*МB*]доп  *R*0 | **0 1 0 0 1 1 1 0 0**  **1 0 1 1 0 0 1 1 1**  **0 0 0 0 0 0 0 1 1** | **0 0 0 0 0 0 0 0**  **0 0 0 0 0 0 0 1** |
| **1** | ←*R*0  [-*МB*]доп  *R*1 | **0 0 0 0 0 0 1 1 0**  **1 0 1 1 0 0 1 1 1**  **1 0 1 1 0 1 1 0 1** | **0 0 0 0 0 0 1 0**  **0 0 0 0 0 0 1 0** |
| **2** | ←*R*1  *МB* пр  *R*2 | **0 1 1 0 1 1 0 1 0**  **0 1 0 0 1 1 0 0 1**  **1 0 1 1 1 0 0 1 1** | **0 0 0 0 0 1 0 0**  **0 0 0 0 0 1 0 0** |
| **3** | ←*R*2  *МB* пр  *R*3 | **0 1 1 1 0 0 1 1 0**  **0 1 0 0 1 1 0 0 1**  **1 0 1 1 1 1 1 1 1** | **0 0 0 0 1 0 0 0**  **0 0 0 0 1 0 0 0** |
| **4** | ←R3  *МВ* пр  *R*4 | **0 1 1 1 1 1 1 1 0**  **0 1 0 0 1 1 0 0 1**  **1 1 0 0 1 0 1 1 1** | **0 0 0 1 0 0 0 0**  **0 0 0 1 0 0 0 0** |
| **5** | ←*R*4  *МB* пр  *R*5 | **1 0 0 1 0 1 1 1 0**  **0 1 0 0 1 1 0 0 1**  **1 1 1 0 0 0 1 1 1** | **0 0 1 0 0 0 0 0**  **0 0 1 0 0 0 0 0** |
| **6** | ←*R*5  *МB* пр  *R*6 | **1 1 0 0 0 1 1 1 0**  **0 1 0 0 1 1 0 0 1**  **0 0 0 1 0 0 1 1 1** | **0 1 0 0 0 0 0 0**  **0 1 0 0 0 0 0 1** |
| **7** | ←*R*6  [-*МB*]доп  *R*7  *МС*→ | **0 0 1 0 0 1 1 1 0**  **1 0 1 1 0 0 1 1 1**  **1 1 0 1 1 0 1 0 1** | **1 0 0 0 0 0 1 0**  **1 0 0 0 0 0 1 0**  **0 1 0 0 0 0 0 1 0** |

С*\** = (0,1000 001)2 · 25 = (10000,01)2 = 16,25.

СТ = 16.33333333 (точное значение).

Определим абсолютную и относительную погрешности результата:

Δ*С* = 16.33333333 – 16,25 = 0,08333333

δ*С* = · 100% = 0,51%

Погрешность вызвана неточным представлением операндов.

**#6**

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