**Дискретная математика**

Домашнее задание №8

«Деление чисел с плавающей запятой»

Вариант №112

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Варианты задания

|  |  |
| --- | --- |
| ***A*** | ***B*** |
| 8,7 | 0,062 |

Ход работы

**#1**

1. Формат *Ф1*

*А* = (8,7)10 = (8,B(3))16 = (0,8B(3))16 · 161

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

*В* = (0,062)10 = (0,0FDF…)16 = (0, FDF…)16 · 16-1

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

1. Формат *Ф2*

*А* = (8,7)10 = (1000,10(1100))2 = (0, 100010(1100)))2 · 24

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

*В* = (0,062)10 = (0,00001111110)2 = (0, 1111110)2 · 2-4

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

**#2, 3, 5**

*XC* = *XA – XB + d*

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

**P*C***

*XC* = 1 – (-1) + 64 = 66

P*C* = 2

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

*С\** = (0,8E)16 · 22 = (8E)16 = 142

СТ = 140,322581 (точное значение).

Определим абсолютную и относительную погрешности результата:

С = 140,322581 – 142 = -1.677419

δ*С* = · 100% = 1,95%

Погрешность вызвана неточным представлением операндов.

**#4, 5**

*XC* = *XA – XB + d*

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

**P*C***

*XC* = 4 – (-4) + 128 = 136

P*C* = 8

|  |  |  |  |
| --- | --- | --- | --- |
| **N шага** | **Действие** | **Делимое** | **Частное** |
| **0** | *МА*  [-*МB*]доп  *R*0 | **0 1 0 0 0 1 0 1 1**  **1 0 0 0 0 0 1 0 0**  **1 1 0 0 0 1 1 1 1** | **0 0 0 0 0 0 0 0**  **0 0 0 0 0 0 0 0** |
| **1** | ←*R*0  *МB* пр  *R*1 | **1 0 0 0 1 1 1 1 0**  **0 1 1 1 1 1 1 0 0**  **0 0 0 0 1 1 0 1 0** | **0 0 0 0 0 0 | 0 0**  **0 0 0 0 0 0 | 0 1** |
| **2** | ←*R*1  [-*МB*]доп  *R*2 | **0 0 0 1 1 0 1 0 0**  **1 0 0 0 0 0 1 0 0**  **1 0 0 1 1 1 0 0 0** | **0 0 0 0 0 | 0 1 0**  **0 0 0 0 0 | 0 1 0** |
| **3** | ←*R*2  *МB* пр  *R*3 | **0 0 1 1 1 0 0 0 0**  **0 1 1 1 1 1 1 0 0**  **1 0 1 1 0 1 1 0 0** | **0 0 0 0 | 0 1 0 0**  **0 0 0 0 | 0 1 0 0** |
| **4** | ←R3  *МВ* пр  *R*4 | **0 1 1 0 1 1 0 0 0**  **0 1 1 1 1 1 1 0 0**  **1 1 1 0 1 0 1 0 0** | **0 0 0 | 0 1 0 0 0**  **0 0 0 | 0 1 0 0 0** |
| **5** | ←*R*4  *МВ* пр  *R*5 | **1 1 0 1 0 1 0 0 0**  **0 1 1 1 1 1 1 0 0**  **0 1 0 1 0 0 1 0 0** | **0 0 | 0 1 0 0 0 0**  **0 0 | 0 1 0 0 0 1** |
| **6** | ←*R*5  [-*МB*] доп  *R*6 | **1 0 1 0 0 1 0 0 0**  **1 0 0 0 0 0 1 0 0**  **0 0 1 0 0 1 1 0 0** | **0 | 0 1 0 0 0 1 0**  **0 | 0 1 0 0 0 1 1** |
| **7** | ←*R*6  [-*МB*] доп  *R7* | **0 1 0 0 1 1 0 0 0**  **1 0 0 0 0 0 1 0 0**  **1 1 0 0 1 1 1 0 0** | **0 1 0 0 0 1 1 0**  **0 1 0 0 0 1 1 0** |
| **8** | <- R7  MB пр  R8 | **1 0 0 1 1 1 0 0 0**  **0 1 1 1 1 1 1 0 0**  **0 0 0 1 1 0 1 0 0** | **1 0 0 0 1 1 0 0**  **1 0 0 0 1 1 0 1** |

С*\** = (0,10001101)2 · 28 = (10001100)2 = 141

СТ = 140,322581 (точное значение).

Определим абсолютную и относительную погрешности результата:

Δ*С* = 140,322581 – 141 = -0,677419

δ*С* = · 100% = 0,483%

Погрешность вызвана неточным представлением операндов.

**#6**

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