Хайкин Олег P3131

Домашняя работа №6

Вариант: 41

1. Формат *Ф1* (число разрядов мантиссы *m* =12).

*А* = (9,165)10 = (9,2A3)16 = (0,92A)16 · 161

М*А*

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

(округление к ближайшему)

*В* = (6,842)10 = (6,D78)16 = (0,6D7)16 · 161

M*B*

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

(округление к ближайшему)

1) *XA* = \_1 0 0 0 0 0 1

*XB* = 1 0 0 0 0 0 1

(*XA-XB*) = 0 0 0 0 0 0 0

(*XA-XB*). = 0; *ХС = ХВ = ХA =*1*.*

а) Оба операнда положительные (*А*>0, *B*>0):

2,3) М*А* = . 1 0 0 1 0 0 1 0 1 0 1 0

+

М*В* = . 0 1 1 0 1 1 0 1 1 0 0 0

М*С* = 1. 0 0 0 0 0 0 0 0 0 0 1 0

Результат сложения денормализован влево.

4

4) МС = . 0 0 0 1 0 0 0 0 0 0 0 0

(*ХС* = *ХС* +1 = 2).

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

*С*

*С*\* = М*С* · 16Р*с* = (0,1)16 · 162 = (10)16 = 16.

*CT =* 9,165+6,842=16,007

Δ*С* = *С*Т - *С*\* = 16,007 – 16 = 0,007,

δ*С* = · 100% = . 100% = 0,04%,

б) *А*<0, *B*>0.

Сложение мантисс будем проводить их прямым вычитанием. В качестве уменьшаемого используем мантиссу положительного операнда (*В*);

2,3) М*В* =. 0 1 1 0 1 1 0 1 1 0 0 0

М*А* =. 1 0 0 1 0 0 1 0 1 0 1 0

М*С(доп)*  =. 1 1 0 1 1 0 1 0 1 1 1 0

Результат получился отрицательным.

Mc(прям) = .0 0 1 0 0 1 0 1 0 0 1 0

Результат сложения нормализован.

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

*С*

*С*\* = -М*С* · 16Р*с* = -(0,252)16 · 161 = -(2,52)16 = -2.3203125.

*CT =* 6,842-9,165=-2,323

Δ*С* = *С*Т - *С*\* = -2,323 – (-2.3203125) = - 0,0026875,

δ*С* = · 100% =. 100% = 0,12%.

в) *А*>0, *B*<0.

Сложение мантисс будем проводить их прямым вычитанием. В качестве уменьшаемого используем мантиссу положительного операнда (*A*);

2,3) М*A* = . 1 0 0 1 0 0 1 0 1 0 1 0

М*B* = . 0 1 1 0 1 1 0 1 1 0 0 0

М*С* = . 0 0 1 0 0 1 0 1 0 0 1 0

Результат сложения нормализован.

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

*С*

*С*\* = М*С* · 16Р*с* = (0,252)16 · 161 = (2,52)16 = 2.3203125.

*CT =* 9,165-6,842 = 2,323

Δ*С* = *С*Т - *С*\* = 2,323 –2.3203125 = 0,0026875,

δ*С* = · 100% =. 100% = 0,12%.

2. Формат *Ф2*.

*А* = (9,165)10 = (9,2A3)16 = (1001,001010100011)2 = (0,100100101010)2 · 24

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

*В* = (6,842)10 = (6,D78)16 = (110,110101111000)2 = (0,110110101111)2 · 23

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

1) *XA* = \_1 0 0 0 0 1 0 0

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

(*XA-XB*) = 0 0 0 0 0 0 0 1

(*XA-XB*). = 1; *ХС = ХA* = 4*.*

а) Оба операнда положительные (*А*>0, *B*>0):

1

2,3) М*А* = . 1 0 0 1 0 0 1 0 1 0 1 0

+

М*В* = . 0 1 1 0 1 1 0 1 0 1 1 1

М*С* = 1 . 0 0 0 0 0 0 0 0 0 0 0 1

Результат сложения денормализован влево.

1

4) МС = . 1 0 0 0 0 0 0 0 0 0 0 0

(*ХС* = *ХС* +1 = 5).

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

*С*

*С*\* = М*С* · 2Р*с* = (0,100000000000)2 · 25 = (10000)2 = 16.

*CT =* 9,165+6,842=16,007

Δ*С* = *С*Т - *С*\* = 16,007 – 16 = 0,007,

δ*С* = · 100% =. 100% = 0,04%.

б) *А*<0, *B*>0.

2,3) М*В* = . 0 1 1 0 1 1 0 1 0 1 1 1

М*А* = . 1 0 0 1 0 0 1 0 1 0 1 0

М*С(доп)* = . 1 1 0 1 1 0 1 0 1 1 0 1

Результат получился отрицательным.

Mc(прям) = .0 0 1 0 0 1 0 1 0 0 1 1

Результат сложения денормализован вправо.

1

1

2

4) МС = . 1 0 0 1 0 1 0 0 1 1 0 0

(*ХС* = *ХС* – 2 = 2).

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

*С*

*С*\* = -М*С* · 2Р*с* = -(0,100101001100)2 · 22 = -(10,0101001100)2 = -2.32421875.

*CT =* 6,842-9,165=-2,323

Δ*С* = *С*Т - *С*\* = -2,323 – (-2.32421875) = 0,00121875.

δ*С* = · 100% =. 100% = 0,05%.

в) *А*>0, *B*<0.

2,3) М*A* = . 1 0 0 1 0 0 1 0 1 0 1 0

М*B* = . 0 1 1 0 1 1 0 1 0 1 1 1

М*С* = . 0 0 1 0 0 1 0 1 0 0 1 1

Результат сложения денормализован вправо.

2

4) МС = . 1 0 0 1 0 1 0 0 1 1 0 0

(*ХС* = *ХС* – 2 = 2).

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

*С*

*С*\* = М*С* · 2Р*с* = (0,100101001100)2 · 22 = (10,0101001100)2 = 2.32421875.

*CT =* 9,165-6,842 = 2,323

Δ*С* = *С*Т - *С*\* = 2,323 – 2.32421875 = -0,00121875.

δ*С* = · 100% =. 100% = 0,05%.

В формате *Ф2* результаты получились точнее из-за того, что операнды представлены точнее и при нормализации результата сдвиг производился на один двоичный разряд, а не на четыре.