

Санкт-Петербургский национальный исследовательский университет ИТМО

Факультет программной инженерии и компьютерной техники

# **Домашняя работа №6**

по дисциплине “Дискретная математика”

вариант 3

Выполнил:

Тимошкин Роман Вячеславович

группа Р3131

Преподаватель:

Поляков Владимир Иванович

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<b>A</b>	<b>B</b>
5,891	2,964

1. Формат Ф1 (число разрядов мантиисы – 12)

$$A = 5.891_{10} = 5.E4_{16} = 0.5E4_{16} * 16^1$$

0	1	0	0	0	0	0	1	0	1	0	1	1	1	1	0	0	1	0	1
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$$B = 2.964_{10} = 2.F6_{16} = 0.2F6_{16} * 16^1$$

0	1	0	0	0	0	0	1	0	0	1	0	1	1	1	1	0	1	1	1
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$$X_A = 1\ 0\ 0\ 0\ 0\ 0\ 1$$

$$X_B = 1\ 0\ 0\ 0\ 0\ 0\ 1$$

$$(X_A - X_B)_{\text{доп.}} = 0\ 0\ 0\ 0\ 0\ 0\ 0$$

$$(X_A - X_B) = 0; X_C = X_B = 1.$$

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

$$M_A = .\ 0\ 1\ 0\ 1\ 1\ 1\ 1\ 0\ 0\ 1\ 0\ 1$$

$$M_B = +.\ 0\ 0\ 1\ 0\ 1\ 1\ 1\ 1\ 0\ 1\ 1\ 1$$

$$M_C = .\ 1\ 0\ 0\ 0\ 1\ 1\ 0\ 1\ 1\ 1\ 0\ 0$$

0	1	0	0	0	0	1	0	1	0	0	0	1	1	0	1	1	1	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$$C^* = M_C * 16^{P_C} = 0.8DC_{16} * 16^1 = 8.DC_{16} = 8.859375$$

$$\Delta C = C_T - C^* = 8.855 - 8.859375 = -0.004375$$

$$\delta C = |\Delta C / C_T| * 100\% = 0.004375 / 8.855 * 100\% = 0.494\%$$

**б)  $A < 0, B > 0$**

$$M_A = .\ 0\ 1\ 0\ 1\ 1\ 1\ 1\ 0\ 0\ 1\ 0\ 1$$

$$M_B = -.\ 0\ 0\ 1\ 0\ 1\ 1\ 1\ 1\ 0\ 1\ 1\ 1$$

$$M_C = .\ 0\ 0\ 1\ 0\ 1\ 1\ 1\ 0\ 1\ 1\ 1\ 0$$

Результат сложения нормализован.

1	1	0	0	0	0	0	1	0	0	1	0	1	1	1	0	1	1	1	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$$C^* = M_C * 16^{P_C} = -0.2EE_{16} * 16^1 = -2.EE_{16} = -2.9296875$$

$$\Delta C = C_T - C^* = -2.927 + 2.9296875 = 0.0026875$$

$$\delta C = |\Delta C / C_T| * 100\% = 0.0026875 / 2.927 * 100\% = 0.092\%$$

**в)  $A > 0, B < 0$**

$$M_A = .010111100101$$

$$M_B = -.001011110111$$

$$M_C = .0010111101110$$

Результат сложения нормализован.

0	1	0	0	0	0	0	1	0	0	1	0	1	1	1	0	1	1	1	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$$C^* = M_C * 16^{P_C} = 0.2EE_{16} * 16^1 = 2.EE_{16} = 2.9296875$$

$$\Delta C = C_T - C^* = 2.927 - 2.9296875 = -0.0026875$$

$$\delta C = |\Delta C / C_T| * 100\% = 0.0026875 / 2.927 * 100\% = 0.092\%$$

**2. Формат Ф2**

$$A = 5.891_{10} = 5.E4_{16} = 0.10111100100_2 * 2^3$$

0	1	0	0	0	0	1	1	0	1	1	1	1	0	0	1	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$$B = 2.964_{10} = 2.F6_{16} = 0.10111101100_2 * 2^2$$

0	1	0	0	0	0	1	0	0	1	1	1	1	0	1	1	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$$\begin{aligned} X_A &= \_1000011 \\ X_B &= \_1000010 \\ (X_A - X_B) &= 1; X_C = X_A = 3 \end{aligned}$$

**а)  $A > 0, B > 0$ :**

$$M_A = .101111001000$$

$\rightarrow 1$

$$M_B = +.010111101100$$

$$M_C = 1.000110110100$$

Результат сложения денормализован влево.

$\rightarrow 1$

$$M_C = .100011011010$$

Т.к. выполнен сдвиг мантиссы вправо, то характеристику результата нужно увеличить на 1 ( $X_C = X_C + 1 = 4$ ).

C

0	1	0	0	0	1	0	0	0	0	0	1	1	0	1	1	0	1	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$$C^* = M_C * 2^{P_C} = 0.100011011010_2 * 2^4 = 1000.11011111_2 = 8.87109375$$

$$\Delta C = C_T - C^* = 8.855 - 8.87109375 = -0.01609375$$

$$\delta C = |\Delta C / C_T| * 100\% = 0.01609375 / 8.855 * 100\% = 0.182\%$$

**б)  $A < 0, B > 0$**

$$M_A = .101111001000$$

$\rightarrow 1$

$$M_B = .010111101100$$

$$M_C = .010111011100$$

Результат сложения денормализован вправо.

$\leftarrow 1$

$$M_C = .101110111000$$

Т.к. выполнен сдвиг мантииссы влево, то характеристику результата нужно уменьшить на 1 ( $X_C = X_C - 1 = 2$ ).

1	1	0	0	0	0	1	1	0	1	0	1	1	1	0	1	1	1	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$$C^* = M_C * 2^{P_C} = -0.101110111000_2 * 2^2 = -10.1110111000_2 = -2.9296875$$

$$\Delta C = C_T - C^* = -2.927 + 2.9296875 = -0.0026875$$

$$\delta C = |\Delta C / C_T| * 100\% = 0.0026875 / 2.927 * 100\% = 0.092\%$$

**в)  $A > 0, B < 0$**

$$M_A = .101111001000$$

$\rightarrow 1$

$$M_B = .010111101100$$

$$M_C = .010111011100$$

Результат сложения денормализован вправо.

$\leftarrow 1$

$$M_C = .101110111000$$

Т.к. выполнен сдвиг мантииссы влево, то характеристику результата нужно уменьшить на 1 ( $X_C = X_C - 1 = 2$ ).

0	1	0	0	0	0	1	1	0	1	0	1	1	1	0	1	1	1	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

$$C^* = M_C * 2^{P_C} = 0.101110111000_2 * 2^2 = 10.1110111000_2 = 2.9296875$$

$$\Delta C = C_T - C^* = 2.927 - 2.9296875 = -0.0026875$$

$$\delta C = |\Delta C / C_T| * 100\% = 0.0026875 / 2.927 * 100\% = 0.092\%$$