

Дискретная математика
Домашнее задание №7
«Умножение чисел с плавающей запятой»
Вариант №86
Выполнил: (гр. Р3133)

Варианты задания

<i>A</i>	<i>B</i>
8,8	0,028

Ход работы

#1

1. Формат $\Phi 1$

$$A = (8,8)_{10} = (8,(C))_{16} = (0,8(C))_{16} \cdot 16^1$$

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

$$B = (0,028)_{10} = (0,072B)_{16} = (0,72B)_{16} \cdot 16^{-1}$$

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

2. Формат $\Phi 2$

$$A = (8,8)_{10} = (1000,11001100110)_2 = (0,100011001100110)_2 \cdot 2^4$$

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

$$B = (0,028)_{10} = (0.00000111001010110)_2 = (0,111001010110)_2 \cdot 2^{-5}$$

0	0	1	1	1	1	0	1	1	1	1	0	0	1	0	1	0	1	1	0
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#2-5

$$\text{Sign}C = \text{Sign}A \oplus \text{Sign}B.$$

$$X_A = P_A + d; \quad X_B = P_B + d;$$

$$X_C = X_A + X_B - d;$$

$$P_C + d = \underline{P_A + d + P_B + d - d}.$$

$$P_C$$

$$X_A \stackrel{\curvearrowright}{=} 1000001$$

$$X_B \stackrel{+}{=} 0111111$$

$$X_A + X_B \stackrel{\curvearrowright}{=} 10000000$$

$$d = \underline{1000000}$$

$$X_C = 1000000$$

$$P_C = 0.$$

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0</

$$C = (0,3EF)_{16} \cdot 16^0 = (0,3EFA)_{16} = 0,24584961$$

Определим абсолютную и относительную погрешности результата:

$$\Delta C = 0,2464 - 0,24584961 = 0,0003978$$

$$\delta C = |\Delta C / 0,2464| \cdot 100\% = 0,2234\%$$

Ф2

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

$$\underline{X_B = 0\ 1\ 1\ 1\ 1\ 0\ 1\ 1}$$

$$X_A + X_B = 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1$$

$$d = 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0$$

$$X_C = 0\ 1\ 1\ 1\ 1\ 1\ 1\ 1$$

$$P_C = -1.$$

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 0	1 1 1 0 0 1 0 1 0 1 0 1 1 0	0
	4M _A	0 0 0 1 0 0 0 1 1 0 0 1 1 0 1 0 0	4M _A 2M _A	
	2M _A	0 0 0 0 1 0 0 0 1 1 0 0 1 1 0 1 0		
1	СЧП	0 0 0 1 1 0 1 0 0 1 1 0 0 1 1 1 0	1 1 1 0 0 1 0 1 0 1 0 1 1 0	0
	СЧП → 4	0 0 0 0 0 0 0 1 1 0 1 0 0 1 1 0 0	1 1 1 0 1 1 1 0 0 1 0 1	
	4M _A	0 0 0 1 0 0 0 1 1 0 0 1 1 0 1 0 0	4M _A M _A	
	0M _A	0 0 0 0 0 1 0 0 0 1 1 0 0 1 1 0 1		
2	СЧП	0 0 0 1 0 1 1 1 1 0 1 0 0 1 1 0 1	1 1 1 0 1 1 1 0 0 1 0 1 0 1	0
	СЧП → 4	0 0 0 0 0 0 0 1 0 1 1 1 1 0 1 0 0	1 1 0 1 1 1 1 0 1 1 1 0	
	-4M _A	1 1 1 0 1 1 1 0 0 1 1 0 0 1 1 0 0	-4M _A 2M _A	
	2M _A	0 0 0 0 1 0 0 0 1 1 0 0 1 1 0 1 0		
3	СЧП	1 1 1 1 0 0 0 0 1 0 1 0 1 1 0 1 0	1 1 0 1 1 1 1 0 1 1 1 0	1
	СЧП → 4	1 1 1 1 1 1 1 1 0 0 0 0 1 0 1 0 1	1 0 1 0 1 1 0 1 1 1 1 0	
	2 ← M _C	1 1 1 1 1 1 0 0 0 0 1 0 1 0 1 1 0	1 0 1 1 0 1 1 1 1 0 0 0	

$$C = (0,11111100001010110)_2 \cdot 2^{-2} = (0,11111100001010110)_2 = 0,2463$$

Определим абсолютную и относительную погрешности результата:

$$\Delta C = 0,2464 - 0,2463 = 0,0001$$

$$\delta C = (\Delta C / 0,2464) \cdot 100\% = 0,04\%$$

#6

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