**Завдання на лабораторну роботу №3**

1. Виконати складання двох додатних довільно обраних двійкових чисел із виконаного вами варіанту завдання.

1 число: 74=**64+8+2**; 2 число: 35=**32+2+1**; 74+35=109

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | **1 число** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 74(10) |

+

| RG  8 bit | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | **2 число** біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 35(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 109(10) |

2. Виконати операцію віднімання через складання прямих та зворотних кодів з корекцією результату. Підібрати пари чисел так, щоби виконувалися наступні варіанти дій:

2.1. А+(-В) та (-А)+В де В>A.

2.2. А+(-В) та (-А)+В де В<A.

2.3. (-А)+(-В) В>A та В<A

2.4. Використати числа, результат складання яких переповнить розрядну сітку (8 або 16 біт). Перехопити та показати біт переповнення.

**2.1** А = 35, В = 74;

**1)** А+(-В)=35+(-74)=-39

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 35(10) |

+

| RG  8 bit | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | -В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | обернений код числа 74(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |  |

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | -39(10) |

**2)** (-А)+В = -35+74=39

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | -А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | обернений код числа 35(10) |

+

| RG  8 bit | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 74(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 38(10) |

+

| RG  8 bit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | втрачений біт переносу |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 39(10) |

**2.2.** А = 74, В = 35;

**1)** А+(-В)=74+(-35)=39

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 74(10) |

+

| RG  8 bit | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | -В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | обернений код числа 35(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |  |

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 38(10) |

+

| RG  8 bit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | втрачений біт переносу |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 39(10) |

**2)** (-А)+В=(-74)+35=-39

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | -А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | обернений код числа 74(10) |

+

| RG  8 bit | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 35(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |  |

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | -39(10) |

**2.3.** В>A та В<A

**1)** В>A; А = 35, В = 74;

(-А)+(-В)=(-35)+(-74)=-109

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | -А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | обернений код числа 35(10) |

+

| RG  8 bit | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | -В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | обернений код числа 74(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |  |

+

| RG  8 bit | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | втрачений біт переносу |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |  |

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | -109(10) |

**2)** В<A; А = 74, В = 35;

(-А)+(-В)=(-74)+(-35)=-109

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | -А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | обернений код числа 74(10) |

+

| RG  8 bit | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | -В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | обернений код числа 35(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |  |

+

| RG  8 bit | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | втрачений біт переносу |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |  |

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | -109(10) |

**2.4.**  1 число = 109; 2 число = 119; 109=**64+32+8+4+1**; 119=**64+32+16+4+2+1**

109+119=228

| RG  16 bit | знак | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | **1 число** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 109(10) |

+

| RG  16 bit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | **2 число**  біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 228(10) |

=

| RG  16 bit | знак | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 228(10) |

3. Провести додавання в додаткових кодах.

3.1. А+(-В) та (-А)+В де В>A.

3.2. А+(-В) та (-А)+В де В<A.

3.3. (-А)+(-В) В>A та В<A

**3.1.** A = 35, B = 74; В>A. **!!!**

**1)** А+(-В)=35+(-74)=-39

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 35(10) |

+

| RG  8 bit | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | -В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | додатковий код числа 74(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |  |

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |  |

+

| RG  8 bit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | + 1 біт до молодшого розряду |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | -39(10) |

**2)** (-А)+В=-35+74=39

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | -А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | додатковий код числа 35(10) |

+

| RG  8 bit | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 74(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат  втрачений біт не додаємо |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 39(10) |

**3.2**. А =74 ,В = 35; В<A.

**1)** А+(-В)=74+(-35)=39

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 74(10) |

+

| RG  8 bit | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | -В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | додатковий код числа 35(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат  втрачений біт не додаємо |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 39(10) |

**2)** (-А)+В=(-74)+35=-39

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | -А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | додатковий код числа 74(10) |

+

| RG  8 bit | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 35(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |  |

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | -38(10) |

+

| RG  8 bit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | + 1 біт до молодшого розряду |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | -39(10) |

**3.3.** (-А)+(-В) В>A та В<A

**1)** А =35 ,В = 74; В>A.

(-А)+(-В)=(-35)+(-74)=-109

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | -А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | додатковий код числа 35(10) |

+

| RG  8 bit | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | -В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | додатковий код числа 74(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |  |

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | -108(10) |

+

| RG  8 bit |  |  |  |  |  |  |  | 0 | біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | втрачений біт переносу |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | -109(10) |

**2)** А =74 ,В = 35; В<A.

(-А)+(-В)=(-74)+(-35)=-109

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | -А |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | додатковий код числа 74(10) |

+

| RG  8 bit | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | -В біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | додатковий код числа 35(10) |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Обернений результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |  |

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | -108(10) |

+

| RG  8 bit |  |  |  |  |  |  |  | 0 | біти переносу |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | втрачений біт переносу |

=

| RG  8 bit | знак | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | -109(10) |

4. Перемножити два довільно обрані числа із результатів виконаного вами варіанту завдання 1 роботи. Розписати поетапно всі дії та виконувати мінімум у 16 розрядних регістрах.   
Виконати дві процедури.

**1)** 74\*35=2590

| RG  16 bit | знак | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | **1 число** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 74(10) |

\*

| RG  16 bit | знак | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 35(10) |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |  |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |  |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| Результат | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | =2590 |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | біти переносу |

**Результат**=2048+512+16+8+4+2=2590.

**2)** 74\*(-109)=-8066

| RG  16 bit | знак | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | **1 число** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 74(10) |

\*

| RG  16 bit | знак | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Результат |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | -109(10) |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |  |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |  |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |  |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| Результат | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | =2590 |
|  | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1,1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | біти переносу |

**Результат**=4096+2048+1024+512+256+128+2=-8066.

5. Використовуючи алгоритми машинного ділення виконати ділення двох чисел із вашого варіанту. В результаті ділення може залишитись остача, тому потрібно знайти остачу та виписати її, а також не забути визначити знак числа. Процес виписати детально та по крокам в таблиці у вигляді стовпчика. Числа обрати довільно, та представити у прямому коді, тому можна використовувати також і від’ємні числа. УВАГА! Число А має бути більшим за В.  
Виконати дві процедури.

**1)** 259/16=16.1875

| RG А  16 bit | знак | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | **1 число** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 259(10) |

/

| RG В  16 bit | знак | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | **2 число** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 16(10) |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | зсув на 4 біт |
| RG +B | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | зворот. код |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | +1 |
| RG -B | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | додат. код |
|  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | RG A |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | RG -B |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | результат 1 |
|  | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | зсув результ. |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | додаю RG -B |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | результат 2 |
|  | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | зсув результ. |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | додаю RG -B |
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | результат 3 |
|  | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | зсув результ. |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | дод. RG -B |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | результат 4 |
|  | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | зсув результ. |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | додаю RG -B |
| 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | результат 5 |
|  | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | зсув результ. |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | додаю RG -B |
| 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | результат 6 |
|  | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | зсув результ. |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | дод. зсунутий RG B |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | результат 7 |
|  | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | зсув результ. |
|  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | дод. зсунутий RG B |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | результат 7 |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Форм. остачу |
|  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | дод. зсунутий RG B |
|  | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | неправильна остача |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | зсув назад на 7 біт |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | правильна остача |

**Результат**=259(10)/16(10)=11111(2) і остача 1110(2)

**2)** 586/(-20)=-29.3

| RG А  16 bit | знак | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | **1 число** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 586(10) |

/

| RG В  16 bit | знак | 16384 | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | **2 число** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | -20(10) |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | зсув на 5 біт |
| RG +B | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | зворот. код |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | +1 |
| RG -B | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | додат. код |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | RG A |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | RG -B |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | результат 1 |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | зсув результ. |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | додаю RG B |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | результат 2 |
|  | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | зсув результ. |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | додаю RG -B |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | результат 3 |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | зсув результ. |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | додаю RG -B |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | результат 4 |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | зсув результ. |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | додаю RG -B |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | результат 5 |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | зсув результ. |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | дод. зсунутий RG B |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | результат 6 |

**Результат=011101(2) остача 11(2)**