**Test cases for number operations and conversions in bases from 2 to 16**

Author: Tasadan Filip

**Important note:** in order to check the correctness of these test cases the user should copy the numbers in red and paste them into console to see that the result (in blue) is the correct one

1. **Operations test cases**
2. **Addition test cases:**
   1. Command number >>1

Enter the base you want to compute the two numbers >>10

Enter the first number value in base 10 >>99

Enter the second number value in base 10 >>2

Result: 99 + 2 = 101 (in base 10)

* 1. Command number >>1

Enter the base you want to compute the two numbers >>5

Enter the first number value in base 10 >>14

Enter the second number value in base 10 >>4

Result: 14 + 4 = 23 (in base 5)

* 1. Command number >>1

Enter the base you want to compute the two numbers >>16

Enter the first number value in base 10 >>A5F

Enter the second number value in base 10 >>96BD

Result: A5F + 96BD = A11C (in base 16)

* 1. Command number >>1

Enter the base you want to compute the two numbers >>2

Enter the first number value in base 2 >>1110

Enter the second number value in base 2 >>11

Result: 1110 + 11 = 10001 (in base 2)

1. **Subtraction test cases:**

2.1) Command number >>2

Enter the base you want to compute the two numbers >> 10

Enter the first number value in base 10 >> 101

Enter the second number value in base 10 >> 2

Result: 101 - 2 = 99 (in base 10)

2.2) Command number >>2

Enter the base you want to compute the two numbers >> 5

Enter the first number value in base 5 >> 23

Enter the second number value in base 5 >> 14

Result: 23 - 14 = 4 (in base 5)

2.3) Command number >>2

Enter the base you want to compute the two numbers >> 16

Enter the first number value in base 16 >> A11C

Enter the second number value in base 16 >> 96BD

Result: A11C - 96BD = A5F (in base 16)

2.4) Command number >>2

Enter the base you want to compute the two numbers >> 2

Enter the first number value in base 2 >> 10001

Enter the second number value in base 2 >> 1110

Result: 10001 - 1110 = 11 (in base 2)

**Observation:** as you can see the subtractions computed above are made by the result of the additions from the point 1 and from it we subtracted one of the addition operands to obtain the other one in order to validate both the addition correctness and the subtraction correctness

**Note:** the test cases for multiplication and division are taken from Seminar 1 exercises (except 3.1 and 4.1) in order to be easier to check their correctness

1. **Multiplication by one digit test cases:**

3.1) Command number >>3

Enter the base you want to compute the two numbers >> 10

Enter the first number value in base 10 >> 15

Enter the second number value in base 10 >> 7

Result: 15 \* 7 = 105 (in base 10)

3.2) Command number >>3

Enter the base you want to compute the two numbers >> 4

Enter the first number value in base 4 >> 2031

Enter the second number value in base 4 >> 3

Result: 2031 \* 3 = 12213 (in base 4)

3.3) Command number >>3

Enter the base you want to compute the two numbers >> 16

Enter the first number value in base 16 >> 2B5F

Enter the second number value in base 16 >> A

Result: 2B5F \* A = 1B1B6 (in base 16)

1. **Division by one digit test cases:**

4.1) Command number >>4

Enter the base you want to compute the two numbers >> 10

Enter the first number value in base 10 >> 66

Enter the second number value in base 10 >> 9

Result: 66 / 9 = 7, r 3 (in base 10)

4.2) Command number >>4

Enter the base you want to compute the two numbers >> 16

Enter the first number value in base 16 >> A5B

Enter the second number value in base 16 >> 8

Result: A5B / 8 = 14B, r 3 (in base 16)

4.3) Command number >>4

Enter the base you want to compute the two numbers >> 8

Enter the first number value in base 8 >> 2043

Enter the second number value in base 8 >> 5

Result: 2043 / 5 = 323, r 4 (in base 8)

1. **Conversions test cases**

**Note:** all the test cases for conversions are taken from Seminar 2 and 3 exercises

1. **Substitution conversion method**
   1. Command number >>5

Enter the source number you want to convert >> 1342

Enter the source base >> 5

Enter the destination base >> 8

The value of 1342 (base 5) is 336 in base 8

* 1. Command number >>5

Enter the source number you want to convert >> 336

Enter the source base >> 8

Enter the destination base >> 5

The value of 336 (base 5) is 1342 in base 8

* 1. Command number >>5

Enter the source number you want to convert >> 1562

Enter the source base >> 7

Enter the destination base >> 16

The value of 1562 (base 7) is 278 in base 16

* 1. Command number >>5

Enter the source number you want to convert >> 278

Enter the source base >> 16

Enter the destination base >> 7

The value of 278 (base 16) is 1562 in base 7

**2. Successive division conversion method**

* 1. Command number >>6

Enter the source number you want to convert >> 362

Enter the source base >> 8

Enter the destination base >> 5

The value of 362 (base 8) is 1432 in base 5

* 1. Command number >>6

Enter the source number you want to convert >> 1432

Enter the source base >> 5

Enter the destination base >> 8

The value of 1432 (base 5) is 362 in base 8

* 1. Command number >>6

Enter the source number you want to convert >> 278

Enter the source base >> 16

Enter the destination base >> 7

The value of 278 (base 16) is 1562 in base 7

* 1. Command number >>6

Enter the source number you want to convert >> 1562

Enter the source base >> 7

Enter the destination base >> 16

The value of 1562 (base 7) is 278 in base 16

**3. Conversion using base 10 as intermediate**

3.1) Command number >>7

Enter the source number you want to convert >> 278

Enter the source base >> 16

Enter the destination base >> 7

The value of 278 (base 16) is 1562 in base 7

3.2) Command number >>7

Enter the source number you want to convert >> 1432

Enter the source base >> 5

Enter the destination base >> 8

The value of 1432 (base 5) is 362 in base 8

**4. Rapid conversion method**

4.1) Command number >>8

Enter the source number you want to convert >> 5327

Enter the source base >> 8

Enter the destination base >> 16

The value of 5327 (base 8) is AD7 in base 16

4.2) Command number >>8

Enter the source number you want to convert >> 6BEA

Enter the source base >> 16

Enter the destination base >> 4

The value of 6BEA (base 16) is 12233222 in base 4

4.3) Command number >>8

Enter the source number you want to convert >> 5327

Enter the source base >> 8

Enter the destination base >> 2

The value of 5327 (base 8) is 101011010111 in base 2