

Remark: Learn to work without a calculator; it will be strictly prohibited during exams.

Exercise 1: How to write a number x in base x .

Exercise 2: Convert from decimal to base b

Convert the following numbers to the indicated bases:

- | | | |
|-----------------------------------|-------------------------------|---------------------------------|
| 1- $(82,125)_{10} = (\dots)_2$ | $(125,875)_{10} = (\dots)_2$ | $(261,4)_{10} = (\dots)_2$ |
| 2- $(255,5)_{10} = (\dots)_8$ | $(684,375)_{10} = (\dots)_8$ | $(1642,4)_{10} = (\dots)_8$ |
| 3- $(240,25)_{10} = (\dots)_{16}$ | $(985,8)_{10} = (\dots)_{16}$ | $(2655,98)_{10} = (\dots)_{16}$ |
| 4- $(68,18)_{10} = (\dots)_3$ | $(530,65)_{10} = (\dots)_5$ | $(638,426)_{10} = (\dots)_9$ |

Exercise 3: Convert from base b to decimal

Convert the following numbers to decimal:

- | | | |
|------------------|-----------------|------------------|
| 1- $(1010,11)_2$ | $(10101,101)_2$ | $(110011,001)_2$ |
| 2- $(17,61)_8$ | $(223,57)_8$ | $(1507,14)_8$ |
| 3- $(9F,A)_{16}$ | $(20F,5D)_{16}$ | $(B3C,E1)_{16}$ |
| 4- $(103,2)_4$ | $(215,34)_6$ | $(423,51)_7$ |

Exercise 4: Find the bases x and y such that: $(403)_x = (103)_{10}$, $(147)_y = (103)_{10}$

Exercise 5: Converting between bases directly without going through base 10

Convert the following numbers to the indicated bases:

- | | | | |
|-------------------------------|----------------------------------|-------------------------------------|---|
| 1- $(207)_8 = (\dots)_2$ | $(3107,2046)_8 = (\dots)_2$ | $(1011110001)_2 = (\dots)_8$ | $(1001101,10101101)_2 = (\dots)_8$ |
| 2- $(1A0F)_{16} = (\dots)_2$ | $(1E0B1,C06A)_{16} = (\dots)_2$ | $(10111010110111)_2 = (\dots)_{16}$ | $(110011000001,011010011)_2 = (\dots)_{16}$ |
| 3- $(60751)_8 = (\dots)_{16}$ | $(10047,50162)_8 = (\dots)_{16}$ | $(1C0B2E)_{16} = (\dots)_8$ | $(30A0,01DF)_{16} = (\dots)_8$ |
| 4- $(203,101)_4 = (\dots)_2$ | $(101101,10101)_2 = (\dots)_4$ | | |

Exercise 6: Binary operations

Perform the following operations

- | | | | |
|--------------------------------|-----------------------------------|--------------------------------|--------------------------------|
| 1- $(1011011)_2 + (1111)_2$ | $(10111)_2 + (1101)_2 + (1011)_2$ | $(10011,0011)_2 + (110,011)_2$ | |
| 2- $(1011001)_2 - (1000111)_2$ | $(1010101)_2 - (111111)_2$ | $(1011,101)_2 - (10,0101)_2$ | |
| 3- $(101101)_2 \times (101)_2$ | $(10101001)_2 \times (111)_2$ | $(101,011)_2 \times (1,111)_2$ | |
| 4- $(1111)_2 \div (101)_2$ | $(100011)_2 \div (100)_2$ | $(111)_2 \div (11)_2$ | $(11101,1101)_2 \div (1,01)_2$ |

Exercise 7: Operations in base b

Perform the following operations

- | | |
|--------------------------------|-----------------------------|
| 1- $(6750)_8 + (5124)_8$ | $(70307)_8 - (40612)_8$ |
| 2- $(FA15)_{16} + (48D2)_{16}$ | $(78DF)_{16} - (3CAB)_{16}$ |
| 3- $(4120)_5 + (3411)_5$ | $(3203)_5 - (2432)_5$ |

Exercise 8: A student wants to transfer software to a storage unit such as:

- The software occupies 4 GB
- The USB flash drive has a capacity of 8 GB
- The capacity of a CD is 1400 MB

1- Is it possible to store the software on the USB flash drive? Explain.

2- How many CDs are needed to store the software?