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

**Exercise 1** *:* How to write a number **a** in base **a**?

**Exercise 2** *: Convert from base b to decimal*
Convert the following numbers to decimal:
    1-  $(10111,101)_2$      $(11010,11)_2$           $(110011,001)_2$
    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 3** *: Convert from decimal to base b*
Convert the following numbers to the indicated bases:
 1-  $(73,125)_{10} = (......)_2$              $(125,875)_{10} = (......)_2$              $(261, 4)_{10}$   $= (......)_2$
 2-  $(255,5)_{10}$  $= (......)_8$          $(684,375)_{10} = (......)_8$           $(1642,8)_{10}$  $= (......)_8$
 3-  $(240,25)_{10} = (......)_{16}$       $(985,8)_{10}$   $= (......)_{16}$          $(2655,98)_{10} = (......)_{16}$
 4-  $(68,18)_{10}$  $= (......)_3$           $(530,65)_{10}$  $= (......)_5$            $(638, 426)_{10} = (......)_9$

**Exercise 4** *: Convertion without going through base 10*
Convert the following numbers to the indicated bases:
    1-  $(207)_8$  $= (...)_2$,     $(3107,2046)_8 = (...)_2$,   $(1011110001)_2 = (...)_8$,   $(1001101,10101101)_2 = (...)_8$
    2-  $(1A0F)_{16} = (...)_2$, $(1E0B1,C06A)_{16} = (...)_2$ , $(10111010110111)_2 = (...)_{16}$, $(110011000001,011010011)_2 = (...)_{16}$
    3-  $(60751)_8 = (...)_{16}$,    $(10047,50162)_8 = (...)_{16}$ ,     $(1C0B2E)_{16} = (...)_8$,        $(30A0,01DF)_{16} = (...)_8$
    4-  $(203,101)_4$  $= (...)_2$,        $(101101,10101)_2 = (...)_4$

**Exercise 5:** Find the bases **x** and **y** such that:      $(403)_x = (103)_{10}$,   $(147)_y = (103)_{10}$

**Exercise 6** *: Binary operations*
Perform the following operations :

    1-  $(1011011)_2 + (1111)_2$                 $(10111)_2 + (1101)_2 + (1011)_2$                      $(10011,0011)_2 + (110,0110)_2$

    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 $2^{22}$ KB.
    -   The USB flash drive has a capacity of 8 GB.
    -   The CD's  capacity 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?
3- What can you deduce?

*Computer Architecture 1*