

LABSHEET 1: INTRODUCTION TO 8085 MICROPROCESSORS

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1. Convert the binary number 01000101 to hexadecimal.

$(01000101)_2$
 Hexadecimal
 $\begin{array}{cc} 0100 & 0101 \\ \hline 4 & 5 \end{array}$
 $= (45)_{16}$

2. Convert the hex number 0x63F to binary.

$0x63F$
 $\begin{array}{l} 6 \rightarrow 0110 \\ 3 \rightarrow 0011 \\ F \rightarrow 1111 \end{array} \left. \vphantom{\begin{array}{l} 6 \\ 3 \\ F \end{array}} \right\} \rightarrow (0110\ 0011\ 1111)_2$

3. Give the signed representations of the decimal 45 in 8-bit binary and hexadecimal.

$(45)_{10}$
 8 bit binary $45 \rightarrow (00101101)_2$
 Hexadecimal $\rightarrow \begin{array}{cc} 0010 & 1101 \\ \hline 2 & D \end{array} \rightarrow 0x2D \rightarrow (2D)_{16}$

4. Specify the signed and unsigned decimal representations of the 8-bit hex number 0x95.

$0x95$
 $\begin{array}{cc} 1001 & 0101 \\ \hline 9 & 5 \end{array} = (10010101)_2 \left. \vphantom{\begin{array}{cc} 1001 & 0101 \end{array}} \right\} \text{unsigned representation}$
 Unsigned +149 $(149)_{10}$
 $1001\ 0101$
 $1's \rightarrow 01101010$
 $2's \rightarrow 01101010$
 $01101011 \Rightarrow (107)_{10}$
 MSB=1
 So -107

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5. Convert the signed binary number $(11011010)_2$ to signed decimal.

$$\begin{array}{r} (11011010)_2 \\ 1's \rightarrow 00100101 \\ 2's \rightarrow 00100101 \quad -38 \\ \hline 00100110 \\ \Rightarrow (38)_{10} \end{array}$$

6. For the unsigned 8-bit number system, the basis elements are $\{128, 64, 32, 16, 8, 4, 2, 1\}$.
What are the basis elements of signed 8-bit number system?

$\{-128, 64, 32, 16, 8, 4, 2, 1\}$

left most bit (bit 7 in an 8 bit system) is used as the sign bit, the value is interpreted as a two's complement representation. if the sign bit is 0, the number is positive if it's 1, the number is negative.

7. Give the representations of -54 in 8-bit binary and hexadecimal.

$$\begin{array}{r} 54 \Rightarrow 00110110 \\ 1's \rightarrow 11001001 \\ 2's \rightarrow 11001001 \quad 8 \text{ bit binary } (11001010)_2 \\ \hline -54 (11001010)_2 \end{array}$$

$$\begin{array}{r} 11001010 \\ \hline \begin{array}{cc} 1100 & 1010 \\ 12 & 10 \end{array} \end{array}$$

$\left. \begin{array}{l} 1100 \rightarrow C \\ 1010 \rightarrow A \end{array} \right\} CA \text{ Hexadecimal } 0xCA$

8. What are the possible values of 8-bit signed numbers?

$-128 \text{ to } +127 \rightarrow \text{range}$

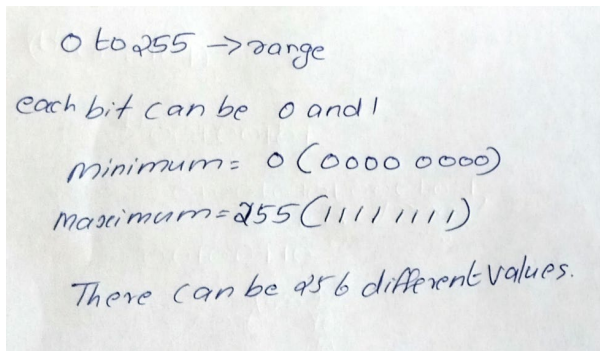
If MSB is 0, number is positive
If MSB is 1, number is negative

So minimum Value obtained = $-128 (10000000)$
Maximum Value obtained = $+127 (01111111)$

They represent 256 different values.

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9. What are the possible values of 8-bit unsigned numbers?\



0 to 255 \rightarrow range
each bit can be 0 and 1
minimum = 0 (0000 0000)
maximum = 255 (1111 1111)
There can be 256 different values.

10. Download a simulator for simple 8-bit processor 8085 in the below link

<https://gnusim8085.github.io/>

11. Fill the machine code for the following assembly program

Assembly	Instruction size	Memory Address	Object Binary Code	Object Code in Hex
Code1:				
MVI A, 32H	2 bytes	4200	0011 1110 0011 0010	3E 32
MVI B, 48H	2 bytes	4202	0000 0110 0100 1000	06 48
ADD B	1 byte	4204	1000 0000	80
OUT 01H	2 bytes	4205	1101 0011 0000 0001	D3 01
HLT	1 bytes	4207	0111 0110	76
Code2:				
MVI A, 01H	2 bytes	4200	0110 1110 0000 0001	3E 01
STA 4500H	3 bytes	4202	0011 0010 0000 0000	32 00 045
HLT	1 byte	4205	0100 0101 0111 0110	76

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Code 3:				
LDA 1000H	3 bytes	4200	0011 1010 0000 0000 0001 0000	3A 00 010
MOV B, A	1 byte	4203	0100 0111	47
LDA 2000H	3 bytes	4204	0011 1010 0000 0000 0010 0000	3A 00 020
STA 1000H	3 bytes	4207	0011 0010 0000 0000 0001 0000	32 00 010
MOV A, B	1 byte	420A	0111 1000	78
STA 2000H	3 bytes	420B	0011 0010 0000 0000 0010 0000	32 00 020
HLT	1 byte	420E	0111 0110	76
Code 4:				
MVI A,55H	2 bytes	4200	0011 1110 0101 0101	3E 55
CMA	1 byte	4202	0010 1111	2F
STA 1001H	3 bytes	4203	0011 0010 0000 0001 0001 0000	32 01 010
MVI A,00H	2 bytes	4206	0011 1110 0000 0000	3E 00
HLT	1 byte	4208	0111 0110	76