



University of Central Punjab

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FACULTY OF INFORMATION TECHNOLOGY

Computer Organization and Assembly Language

Lab 09

Topic 1. MUL, IMUL, DIV and IDIV instructions

Examples for illustrating the differences of MUL and IMUL

No.	AX	BX	Instru ction	Decimal product	Hex product	DX	AX	CF/OF
1	1h	FFFFh	MUL BX	65535	0000 FFFF	0000	FFFF	0
			IMUL BX	-1	FFFF FFFF	FFFF	FFFF	0
2	FFFFh	FFFFh	MUL BX	42948362 25	FFFE 0001	FFFE	0001	1
			IMUL BX	1	0000 0001	0000	0001	0
3	0FFFh	X	MUL AX	16769025	00FF E001	00FF	E001	1
			IMUL AX	16769025	00FF E001	00FF	E001	1
4	0100h	FFFFh	MUL BX	16776960	00FF FF00	00FF	FF00	1
			IMUL BX	-256	FFFF FF00	FFFF	FF00	0

Examples for illustrating the differences of DIV and IDIV



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No.	DX	AX	BX	Instruction	Decimal quotient	Decimal Remainder	AX	DX
1	0000h	0005h	0002h	DIV BX	2	1	0002	0001
				IDIV BX	2	1	0002	0001
2	0000h	0005h	FFFEh	DIV BX	0	5	0000	0005
				IDIV BX	-2	1	FFFE	0001
3	FFFFh	FFFBh	0002h	DIV BX	Divide Overflow			
				IDIV BX	-2	-1	FFFE	FFFF

Examples (Mul and IMUL)

a) MOV AL, 0x9 ;

MOV BL, 0x7 ;

MUL BL ; The product will be in AX in this case

b) MOV AX, 0x90AB ; DECIMAL 37035

MOV BX, 0x332 ; DECIMAL 818

MUL BX ; NOTE IN THIS CASE THE RESULTANT VALUE IS DOUBLE SO THE HIGHER BITS ARE STORED IN DX REGISTER

c) MOV AX, 0x90AB ; DECIMAL -28501

MOV BX, 0x332 ; DECIMAL 818

IMUL BX ; NOTE IN THIS CASE THE RESULTANT VALUE IS DOUBLE SO THE HIGHER BITS ARE STORED IN DX REGISTER



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MUL INSTRUCTION- OPERANDS

Multiplicand	Multiplier	Destination product
AL	Reg8/mem8	AX
AX	Reg16/mem16	DX: AX

Examples (Div and Idiv)

- a)
- MOV AL, 9 ;
MOV BL, 4 ;
DIV BL ;Divides AX/BL, gives AL=02 (quotient) and AH=01 (remainder);
In this example, it is assumed that value in AH=0
- b)
- MOV AH,01
MOV AL,9 ; AX=0109
MOV BL, 4 ; BL=04
DIV BL ; 265/4 gives quotient AL=42 hex (66 decimal) and remainder AH=01.
- c)
- MOV ah, 0x80
mov al,0x23
MOV bx,0x8000;
IDIV bx;Divides [DX:AX]/BX, gives AX=0xFFFF (quotient) and DX=0x23 (remainder);



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Practice Task

Write an assembly language program to find the even numbers in an array.

If a number is even replace it with 1 else if it is not replace with 0.

Let values are (byte size)

Index	0	1	2	3	4	5	6	7
Value	0x05	0xEF	0xDE	0x64	0x38	0x0D	0x84	0x0A

Index	0	1	2	3	4	5	6	7
Value	0	?	?	?	?	?	?	1