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| **Cairo University** | **CMP201** | **Total: 45 Points** |
| **Faculty of Engineering** | **Microprocessor Systems (A)** | **2016-2017** |
| **Computer Eng. Department** | **Midterm Exam** | **One Hour** |

**This is an open-book, open notes exam. All electronic devices - Except calculators - are forbidden.  
Make any reasonable assumptions (if necessary)  
Answer the following questions [any answer outside answer location will be discarded]**

1. [2] Increasing the segment register increases the number of possible segment starting locations
2. [4] What is the function of the following programs

|  |  |
| --- | --- |
| MOV AX,N  MOV BX,N  MUL AX  MUL BX  MOV N2,AX | MOV AX,A  MOV BX,B  ADD AX,BX |
| N2=N3 | AX=A+B |

1. [4] Circle all syntax errors of the following program and write the reason of each

|  |  |
| --- | --- |
|  | Reason |
| MOV CL,[BX][DI]+10 | …………………………………………………………………………………….. |
| MOV DS, 20H | Immediate with segment register |
| MOV ES,DX | …………………………………………………………………………………….. |
| MOV DL,234H | Operand size mismatch |
| MOV BL,[0FAD10H] | Large Number as offset |
| MOV VAR1,BL | …………………………………………………………………………………….. |
| XOR VAR2,AL | …………………………………………………………………………………….. |
| MOV VAR1,VAR2 | Memory to Memory |

1. [4] Write a single instruction for each of the following operations. Note that no other changes should occur.
   1. Set the most significant nibble in AX to 1: OR AX,0F000H
   2. Clear the even-numbered bits in AX to 0 : AND AX,0AAAAH
2. [10] A microprocessor designer decided to modify the 8086 microprocessor. He suggested to increase the address bus to 40 bits.
3. What would be the size of the total addressing space on this new device?

=240 = 1 Tera

1. The designer find out that all registers are 16 bit. Therefore, the traditional method of memory addressing [DS:IP] is not valid. Suggest a new suitable method.

[**ANSWER ON THE BACK OF THIS PAGE**]

1. [2] Identify the operand addressing mode used in each of these instructions.
2. AND DX,AX : Register
3. JMP JMPTAB[BX] : Base +Disp (Based Relative)
4. [3] Assuming that 8086 address bus was 24 bits. The DS= 1234H and the offset =1212H calculate the physical address.

PA=123400+1212=124612H [Note: 123400 not 12340]

1. [3] The following two codes make the same operation. Which of them is better? Why?

|  |  |
| --- | --- |
| CMP AL,0EFH  JA LBL  ; First Code Section  JMP LBL2  LBL:  ; Second Code Section  LBL2: | CMP AL,0EFH  JBE LBL  ; Second Code Section  JMP LBL2  LBL:  ; First Code Section  LBL2: |
| **A** | **B** |

Code A is better because branch penalty

1. [2] For an image that contains a lot of colors, it is preferable to use (low/high) low resolution video mode because it is required to increase the number of available colours
2. [5] Write a program that tests whether a string is a palindrome (sequence that reads the same backward as forward) [**ANSWER ON THE BACK OF THIS PAGE**]
3. [4] Make a drawing program that allow the user to draw using mouse [**ANSWER ON THE BACK OF THIS PAGE**]
4. [3] Assume signed operation, modify the following code to avoid overflow problem

|  |  |  |  |
| --- | --- | --- | --- |
| MOV AL,60H  MOV BL,46H  ADD AL,BL | MOV AL,60H  CBW  MOV BX,AX  MOV AL,46H  CBW  ADD AX,BX |  |  |

10-

11-

mov ah,0

mov al,13h

int 10h

DPixel: mov al,5 ;Pixel color

mov ah,0ch ;Draw Pixel Command

int 10h

mov ax,3;Get mouse position in CX,DX- BX:Button status

GetPos: int 33h

cmp bl,1

jne GetPos

JMP DPixel