EENG411 - MIDTERM EXAM
SPRING 2008-2009

Q1- a) $DX = 896AH$, $CX = 9CABH$ $\Rightarrow$ $DH = DH + CL$

$89H + ABH = 34H$ (1000 1001 + 1010 1011 = 0011 0100), $CF = 1$

$\Rightarrow CX = 9CABH$, $DX = 346AH$, $CF = 1$ $\Rightarrow$ $CX + DX + 1$

$9CABH + 346AH + 1 = 0116H$

(1001 1100 1010 1011 + 0011 0100 0110 1010 + 1 = 1101 0001 0001 0110)

$\Rightarrow$ **$DX = 346AH$, $CX = 0116H$**

$CF = 0$, $PF = 0$, $AF = 1$, $SF = 1$, $ZF = 0$

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b) $AX = 29FEH$ $\Rightarrow$ 0010 1001 $\xrightarrow{\text{SHL 3 times}}$ 0100 1000 $\Rightarrow AH = 48H$, $CF = 1$

$CX = 8C03H$

$\Downarrow$

$AX = 48FEH$, $CX = 8C03H$ $\Rightarrow$ $AX = AX - CX - 1$

$= AX - (CX + 1) = 48FE - 8C04H$

2's comp of 8C04H $\Rightarrow$ 1000 1100 0000 0100 $\rightarrow$ 1's comp

0111 0011 1111 1011 + 1 = 0111 0011 1111 1100 = 73FCH

$48FEH + 73FCH = BCFAH$

0 0100 1000 1111 1110 + 0111 0011 1111 1100 = 1011 1100 1111 1010

invert the carry

$AX = BCFAH$, **$CX = 8C03H$**

$CF = 1$, $PF = 1$, $AF = 1$, $SF = 1$, $ZF = 0$

Q1 - C)

```
        MOV SI, AX
        MOV DI, BX
        MOV CX, 16
        MOV DX, 0000H
BACK:   SHL AX, 1
        JNC NEXT1
        INC DL
NEXT1:  SHL BX, 1
        JNC NEXT2
        INC DH
NEXT2:  DEC CX
        JNZ BACK
        CMP DL, DH
        JB OVER
        MOV DX, SI
        JMP LAST
OVER:   MOV DX, DI
LAST:   MOV AX, SI
        MOV BX, DI
```

```
        MOV CX, 16
        MOV DX, 0000H
        ROR AX, 1
        JNC OVER1
        INC DL
OVER1:  ROR BX, 1
        JNC OVER2
        INC DH
OVER2:  CMP DX, DH
        JB NEXT
        MOV DX, AX
        JMP LAST
NEXT:   MOV DX, BX
```

LOOP BACK

(Q2)

```
CAPITALISE: MOV CX, 49
            MOV SI, OFFSET INSTR
            MOV DI, OFFSET OUTSTR
            MOV AL, [SI]
            JMP NEXT
REPEAT:     MOV AL, [SI]
            CMP AL, ' '
            JE OVER
            OR AL, 00100000B
            JMP NEXT
OVER:       MOV [DI], AL
            INC SI
            INC DI
            DEC CX
            MOV AL, [SI]
            AND AL, 11011111B
NEXT:       MOV [DI], AL
            INC SI
            INC DI
            DEC CX
            JNZ REPEAT
            RET
```

(Q3)

```
QUADADD: MOV SI, OFFSET X
         MOV DI, OFFSET Y
         MOV BX, OFFSET Z
         MOV CX, 4
         CLC
BACK:    MOV AL, [SI]
         ADC AL, [DI]
         MOV [BX], AL
         INC SI
         INC DI
         INC BX
         MOV AH, 00
         ADC AH, 00
         INC BX
         MOV [BX], AH
         RET.
```

→ LOOP BACK

Q4)

```
.MODEL SMALL
.STACK
.DATA
ASCBUF  DB   7,?,7DUP(?)
BCDNUM  DB   3DUP(?)

.CODE
MAIN:  MOV   AX,@DATA
       MOV   DS,AX
       MOV   AH,0AH
       MOV   DX,OFFSET ASCBUF
       INT   21H
       MOV   DI,OFFSET BCDNUM
       MOV   SI,OFFSET ASCBUF
       ADD   SI,2
       CALL  ASC2BCD
       INC   SI
       INC   SI
       INC   DI
       CALL  ASC2BCD
       INC   SI
       INC   SI
       INC   DI
       CALL  ASC2BCD
       ~~MOV   CX,6~~
       ~~Call  0~~
       MOV   AH,02
       MOV   DH,12
       MOV   DL,34
       INT   10H

       MOV CX,6  ------>  MOV SI,OFFSET ASCBUF
                          ADD SI,2
BACK:  CALL DISPCHAR
       LOOP BACK
       MOV  AH,4CH
       INT  21H

ASC2BCD: MOV  AX,[DI]      ; 'XY' => AX=37 3XH
         AND  AX,0F0FH
         PUSH CX
         MOV  CL,4
         SHL  AL,CL  ------> POP CX
         OR   AL,AH
         MOV  [DI],AL
         RET
DISPCHAR: MOV AH,02
          MOV DL,[SI]
          INT 21H
          RET

          END MAIN
```