System Programming Lab
BCSE 3rd year 1st Semester
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>> I have done this assignment using emu8086

Assignment 2

Q1:

```
; Write and test a MASM program to add and subtract two 16 bit numbers.

.model small

.stack 300h

.data

msg1 db 0AH,0DH,'ENTER 1ST NUMBER: $'

msg2 db 0AH,0DH,'ENTER 2ND NUMBER: $'

msg3 db 0AH,0DH,'THE RESULT AFTER ADDITION: $'

msg4 db 0AH,0DH,'THE RESULT AFTER SUBTRACTION: $'

space db ' $'

endl db 0AH,0DH,'$'


val1 dw ?

val2 dw ?
```

```
.code
print macro msg
        push ax
        push dx
        mov ah, 09h
        lea dx, msg
        int 21h
        pop dx
        pop ax
endm

main proc
        mov ax,@data
        mov ds,ax

        start:

        print msg1

        call readnum
        mov val1, ax
```

```
        print msg2

        call readnum
        mov val2, ax

        print msg3
    mov ax, val1
    mov bx, val2
    add ax,bx
        call writenum

    print msg4
    mov ax, val1
    mov bx, val2
    sub ax,bx
    call writenum

        exit:
    mov ah, 4ch
    int 21h
main endp
```

```
readnum proc near
        ; this procedure will take a number as input from user and store in AX
        ; input : none

        ; output : AX


        push bx
        push cx
        mov cx,0ah
        mov bx,00h
        loopnum:
                mov ah,01h
                int 21h
                cmp al,'0'
                jb skip
                cmp al,'9'
                ja skip
                sub al,'0'
                push ax
                mov ax,bx
                mul cx
```

```
                mov bx,ax
                pop ax
                mov ah,00h
                add bx,ax
        jmp loopnum

        skip:
        mov ax,bx
        pop cx
        pop bx
        ret
readnum endp

writenum proc near
        ; this procedure will display a decimal number
        ; input : AX
        ; output : none

        push ax
        push bx
        push cx
        push dx
```

```
xor cx, cx
mov bx, 0ah

@output:
        xor dx, dx
        div bx                  ; divide AX by BX
        push dx                 ; push remainder onto the STACK
        inc cx
        or ax, ax
jne @output

mov ah, 02h                 ; output

@display:
        pop dx                  ; pop a value(remainder) from STACK to DX
        or dl, 30h              ; convert decimal to ascii code
        int 21h
loop @display

pop dx
pop cx
```

```
        pop bx
        pop ax
        ret
writenum endp

end main
```

```
; Write and test a MASM program to add and subtract two 16 bit numbers.
.model small
.stack 300h
.data
msg1 db 0AH,0DH,'ENTER 1ST NUMBER: $'
msg2 db 0AH,0DH,'ENTER 2ND NUMBER: $'
msg3 db 0AH,0DH,'THE RESULT AFTER ADDITION: $'
msg4 db 0AH,0DH,'THE RESULT AFTER SUBTRACTION: $'
space db ' $'
endl db 0AH,0DH,'$'

val1 dw ?
val2 dw ?

.code
print macro msg
    push ax
    push dx
    mov ah, 09h
    lea dx, msg
    int 21h
    pop dx
    pop ax
endm

main proc
    mov ax,@data
    mov ds,ax

    start:
```

```
emulator screen (80x25 chars)

ENTER 1ST NUMBER: 7
ENTER 2ND NUMBER: 4
THE RESULT AFTER ADDITION: 11
THE RESULT AFTER SUBTRACTION: 3
```

Q3:

; Write and test a program to print pairs of even numbers where the summation of the numbers in each pair is 100.

```
.model small

.stack 300h

.data

char1 db '($'

char2 db ')$'

space db ' $'

endl db 0AH,0DH,'$'


val1 dw ?

val2 dw ?


.code

print macro msg

        push ax

        push dx

        mov ah, 09h

        lea dx, msg

        int 21h

        pop dx
```

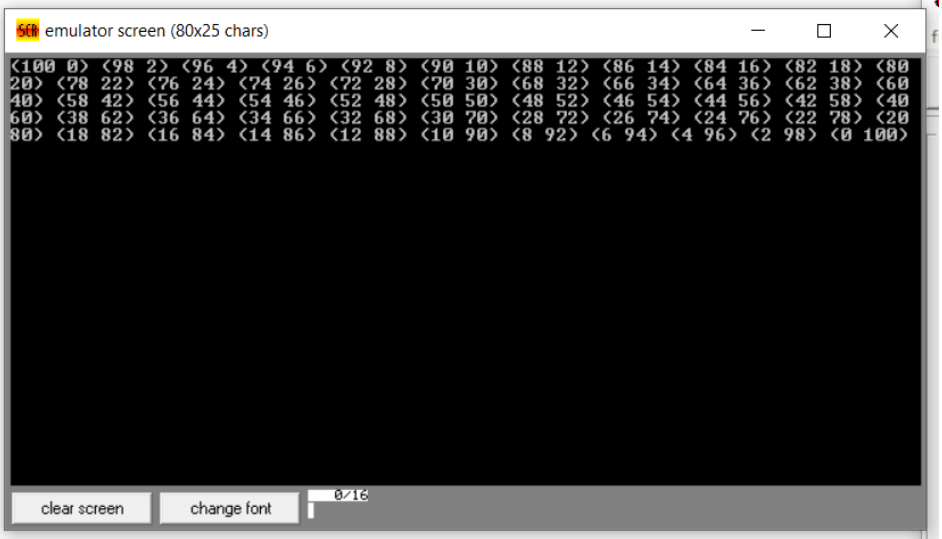
```
        pop ax
endm

main proc
        mov ax,@data
        mov ds,ax

        start:

        mov bx, 100
        mov ax, 100
        loop1:
                print char1
                call writenum
                print space
                mov val1, ax

                mov ax, bx
                mov cx, val1
                sub ax, cx
                call writenum
                print char2
```

```
        print space

        mov ax, val1
        sub ax,2
        jnz loop1

    print char1
    call writenum
    print space
    mov ax, 100
    call writenum
    print char2

    exit:
  mov ah, 4ch
  int 21h

main endp

writenum proc near
    ; this procedure will display a decimal number
    ; input : AX
```

```
; output : none

push ax
push bx
push cx
push dx

xor cx, cx
mov bx, 0ah

@output:
        xor dx, dx
        div bx                  ; divide AX by BX
        push dx                 ; push remainder onto the STACK
        inc cx
        or ax, ax
jne @output

mov ah, 02h                     ; output

@display:
        pop dx                  ; pop a value(remainder) from STACK to DX
```

```
        or dl, 48           ; convert decimal to ascii code
        int 21h
    loop @display

    pop dx
    pop cx
    pop bx
    pop ax

    ret
writenum endp
end main
```

```
; Write and test a program to print pairs of even numbers where the summation of the numbers in ea
.model small
.stack 300h
.data
char1 db '($'
char2 db ')$'
space db ' $'
endl db 0AH,0DH,'$'

val1 dw ?
val2 dw ?

.code
print macro msg
    push ax
    push dx
    mov ah, 09h
    lea dx, msg
    int 21h
    pop dx
    pop ax
endm

main proc
    mov ax,@data
    mov ds,ax

    start:

    mov bx, 100
    mov ax, 100
    loop1:
        print char1
        call writenum
        print space
        mov val1, ax

        mov ax, bx
        mov cx, val1
        sub ax, cx
        call writenum
        print char2
        print space

        mov ax, val1
        sub ax,2
        jnz loop1

    print char1
    call writenum
    print space
    mov ax, 100
    call writenum
    print char2

    exit:
    mov ah, 4ch
    int 21h
```



Q4:

```
; Write and test a MASM program to multiply two 32 bit numbers.
.model small
.stack 300h
.data
msg1 db 0AH,0DH,'ENTER 1ST NUMBER: $'
msg2 db 0AH,0DH,'ENTER 2ND NUMBER: $'
msg3 db 0AH,0DH,'THE RESULT AFTER MULTIPLYING IS: $'
space db ' $'
endl  db 0AH,0DH,'$'

val1 dw ?
val2 dw ?

.code
print macro msg
        push ax
        push dx
        mov ah, 09h
        lea dx, msg
        int 21h
        pop dx
```

```
        pop ax
endm

main proc
        mov ax,@data
        mov ds,ax

        start:

        print msg1

        call readnum
        mov val1, ax

        print msg2

        call readnum
        mov val2, ax

        print msg3
        mul val1
        call writenum
```

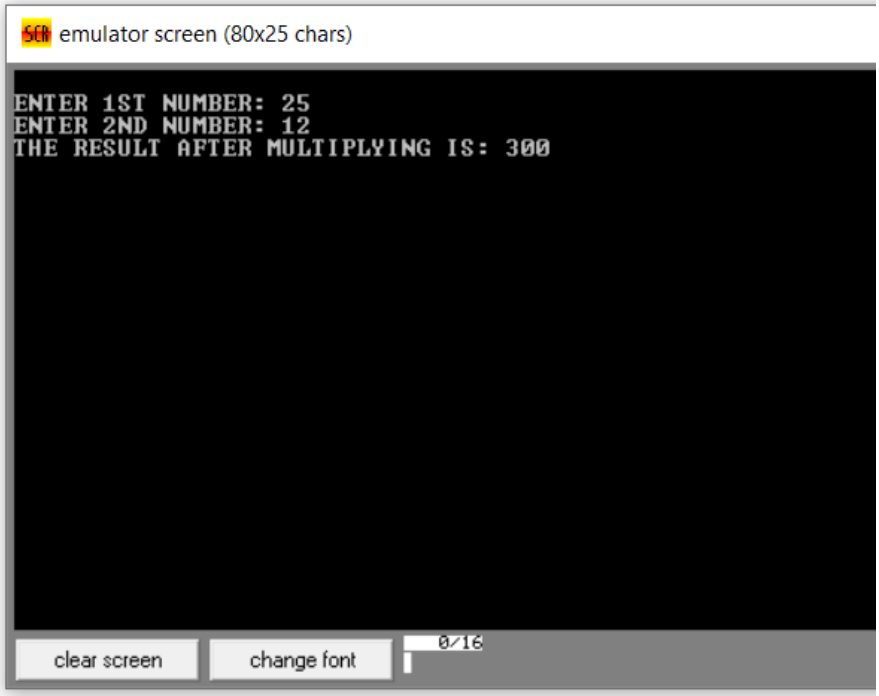
```
        exit:
    mov ah, 4ch
    int 21h

main endp

readnum proc near
        ; this procedure will take a number as input from user and store in AX
        ; input : none
        ; output : AX
        push bx
        push cx
        mov cx,0ah
        mov bx,00h
        loopnum:
                mov ah,01h
                int 21h
                cmp al,'0'
                jb skip
                cmp al,'9'
                ja skip
```

```
                sub al,'0'
                push ax
                mov ax,bx
                mul cx
                mov bx,ax
                pop ax
                mov ah,00h
                add bx,ax
        jmp loopnum
        skip:
        mov ax,bx
        pop cx
        pop bx
        ret
readnum endp

writenum proc near
        ; this procedure will display a decimal number
        ; input : AX
        ; output : none
        push ax
        push bx
```

```
push cx
push dx
xor cx, cx
mov bx, 0ah

@output:
        xor dx, dx
        div bx  ; divide AX by BX
        push dx                 ; push remainder onto the STACK
        inc cx
        or ax, ax
jne @output
mov ah, 02h                 ; set output function

@display:
        pop dx                  ; pop a value(remainder) from STACK to DX
        or dl, 30h              ; convert decimal to ascii code
        int 21h
loop @display

pop dx
pop cx
```

```
        pop bx
        pop ax
        ret
writenum endp
end main
```

```
; Write and test a MASM program to multiply two 32 bit numbers.
.model small
.stack 300h
.data
msg1 db 0AH,0DH,'ENTER 1ST NUMBER: $'
msg2 db 0AH,0DH,'ENTER 2ND NUMBER: $'
msg3 db 0AH,0DH,'THE RESULT AFTER MULTIPLYING IS: $'
space db ' $'
endl  db 0AH,0DH,'$'

val1 dw ?
val2 dw ?

.code
print macro msg
    push ax
    push dx
    mov ah, 09h
    lea dx, msg
    int 21h
    pop dx
    pop ax
endm

main proc
    mov ax,@data
    mov ds,ax

    start:

    print msg1

    call readnum
    mov val1, ax

    print msg2

    call readnum
    mov val2, ax

    print msg3
    mul val1
    call writenum

    exit:
    mov ah, 4ch
    int 21h
```



Q6:

```
; Write and test a MASM program to Print Fibonacci series up to 10 terms.
.model small
.stack 100h
.data
x db 0ah, 0dh, "$"
.code

main proc
   mov ax, @data
   mov ds, ax
   mov al, 0
   mov bl, 1

   call display_number
   mov al, bl
   call display_number
   mov al, 0
   mov ch, 02h
   l1:
      mov cl, bl
      add bl, al
```

```
        mov al, bl
        call display_number
        mov al, cl
        inc ch
        cmp ch, 10
        jne l1

    mov ah, 4ch
    int 21h
main endp

display_number proc
    push bx
    mov bl, 10
    mov bh, 00h
    l2:
        mov ah, 00h
        div bl
        push ax
        inc bh
        cmp al, 0
        jne l2
```

```
    l3:
        pop dx
        mov dl, dh
        mov dh, 0
        add dl, 48
        mov ah, 02h
        int 21h
        dec bh
        cmp bh, 0
        jne l3
    lea dx, x
    mov ah, 09h
    int 21h
    pop bx
    ret
display_number endp
end
```

```
; Write and test a MASM program to Print Fibonacci series up to 10 terms.
.model small
.stack 100h
.data
x db 0ah, 0dh, "$"
.code

main proc
    mov ax, @data
    mov ds, ax
    mov al, 0
    mov bl, 1

    call display_number
    mov al, bl
    call display_number
    mov al, 0
    mov ch, 02h
    l1:
        mov cl, bl
        add bl, al
        mov al, bl
        call display_number
        mov al, cl
        inc ch
        cmp ch, 10
        jne l1

    mov ah, 4ch
    int 21h
main endp
```

Q10:

; Write and test a MASM program to print prime numbers between 1 to 100.

```
.model small

.stack 100

.data

   res db 3 dup(0)

   msg db "Primes from 1 to 100 : ",13,10,"$"
```

```
.code
main proc
mov ax,@data
mov ds,ax

lea dx,msg
mov ah,9
int 21h

mov dl,1
mov cx,25
l1:
  mov bl, 02
  add dl, 01h

  cmp dl, 02h
  je print
  cmp dl, 03h
  je print
  cmp dl, 04h
  jge Logic
```

```
    logic:
        mov ah, 00
        mov al, dl
        div bl
        cmp ah, 00
      je l1
        add bl, 01h
        cmp bl, al
        jle Logic
      jmp print

    print:
      mov al, dl
      mov ah,00
      call output
      loop l1

    exit:
      mov ah, 4ch
      int 21h
    ret
main endp
```

```
output proc ;data is in ax as always
    push ax
    push bx
    push cx
    push dx
    mov cx,0
    mov bx,10
    mov si,offset res
loop1:
      mov dx,0
      div bx
      add dl,30h
      push dx
      inc cx
      cmp ax,9
      jg loop1

      add al,30h
      mov [si],al

loop2:
```

```
        pop ax
        inc si
        mov [si],al
        loop loop2

    mov dl,res[0]
    mov ah,2
    int 21h

    mov dl,res[1]
    int 21h

    mov dl,32
    int 21h

    pop dx
    pop cx
    pop bx
    pop ax
    ret
output endp
```

end main

```
; Write and test a MASM program to print prime numbers between 1 to 100.
.model small
.stack 100
.data
    res db 3 dup(0)
    msg db "Primes from 1 to 100 : ",13,10,"$"
.code
main proc
mov ax,@data
mov ds,ax

lea dx,msg
mov ah,9
int 21h

mov dl,1
mov cx,25
l1:
   mov bl, 02
   add dl, 01h

   cmp dl, 02h
   je print
   cmp dl, 03h
   je print
   cmp dl, 04h
   jge Logic

    logic:
          mov ah, 00
          mov al, dl
          div bl
          cmp ah, 00
```