MIT Practicals
Assignment 9
Krunal Rank (U18CO081)

Question 1: Program to multiply signed 16-bit numbers.

```
;Author: KRHero
;IDE: VSCode

.model small
.stack 256
.data
num1 dw 2541h
num2 dw 8456h
res dd ?

.code
start:
mov ax,@data
mov ds,ax

mov ax, num1
mov bx, num2
imul bx

mov word ptr res,ax
mov word ptr res+2,dx



mov ah,4ch
int 21
end start
```

```
AX=2541  BX=8456  CX=0024  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000C   NV UP EI PL NZ NA PO NC
076A:000C F7EB          IMUL    BX
-t

AX=07D6  BX=8456  CX=0024  DX=EE01  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000E   OV UP EI PL NZ NA PO CY
076A:000E A30400        MOV     [0004],AX                       DS:0004=36E8
-t

AX=07D6  BX=8456  CX=0024  DX=EE01  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0011   OV UP EI PL NZ NA PO CY
076A:0011 89160600      MOV     [0006],DX                       DS:0006=7227
-t
```

```
-d 076C:0000
076C:0000  41 25 56 84 D6 07 01 EE-39 E8 AA 24 06 1E 89 46   A%V.....9..$...F
076C:0010  FE 89 5E FC 50 55 8B EC-C7 46 02 00 00 5D 50 55   ..^.PU...F...]PU
```

Question 2: Program to multiply unsigned 16-bit numbers.

```
;Author: KRHero
;IDE: VSCode

.model small
.stack 256

.data
num1 dw 2541h
num2 dw 8456h
res dd ?

.code
start:
mov ax,@data
mov ds,ax

mov ax, num1
mov bx, num2
mul bx

mov word ptr res,ax
mov word ptr res+2,dx


mov ah,4ch
int 21
end start
```

```
AX=2541  BX=8456  CX=0024  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000C   NV UP EI PL NZ NA PO NC
076A:000C F7E3          MUL     BX
-t

AX=07D6  BX=8456  CX=0024  DX=1342  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000E   OV UP EI PL NZ NA PO CY
076A:000E A30400        MOV     [0004],AX                       DS:0004=36E8
-t

AX=07D6  BX=8456  CX=0024  DX=1342  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0011   OV UP EI PL NZ NA PO CY
076A:0011 89160600      MOV     [0006],DX                       DS:0006=7227
-t
```

```
-d 076C:0000
076C:0000  41 25 56 84 D6 07 42 13-39 E8 AA 24 06 1E 89 46   A%V...B.9..$...F
076C:0010  FE 89 5E FC 50 55 8B EC-C7 46 02 00 00 5D 50 55   ..^.PU...F...]PU
```

Question 3: Program for division of unsigned 8-bit numbers.

```
;Author: KRHero
;IDE: VSCode

.model small
.stack 256

.data
num1 db 08h
num2 dw 256h
quotient db ?
remainder db ?

.code
start:
mov ax,@data
mov ds,ax

mov ax, num2
mov bl, num1
div bl

mov quotient,al
mov remainder,ah


mov ah,4ch
int 21
end start
```

```
AX=076C  BX=0000  CX=0023  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=075A  ES=075A  SS=076D  CS=076A  IP=0003   NV UP EI PL NZ NA PO NC
076A:0003 8ED8          MOV     DS,AX
-t

AX=076C  BX=0000  CX=0023  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0005   NV UP EI PL NZ NA PO NC
076A:0005 A10100        MOV     AX,[0001]                       DS:0001=0256
-t

AX=0256  BX=0000  CX=0023  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0008   NV UP EI PL NZ NA PO NC
076A:0008 8A1E0000      MOV     BL,[0000]                       DS:0000=08
-t

AX=0256  BX=0008  CX=0023  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000C   NV UP EI PL NZ NA PO NC
076A:000C F6F3          DIV     BL
-t

AX=064A  BX=0008  CX=0023  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000E   NV UP EI PL NZ NA PO NC
076A:000E A20300        MOV     [0003],AL                       DS:0003=FB
-
```

```
-d 076C:0000
076C:0000  08 56 02 4A 06 36 27 72-39 E8 AA 24 06 1E 89 46   .V.J.6'r9..$...F
076C:0010  FE 89 5E FC 50 55 8B EC-C7 46 02 00 00 5D 50 55   ..^.PU...F...]PU
```

Question 4: Program for division of unsigned 16-bit numbers.

```
;Author: KRHero
;IDE: VSCode

.model small
.stack 256

.data
num1 dw 120h
num2 dw 256h
quotient dw ?
remainder dw ?

.code
start:
mov ax,@data
mov ds,ax

mov ax, num2
mov bx, num1
div bx

mov word ptr quotient,ax
mov word ptr remainder,dx


mov ah,4ch
int 21
end start
```

```
AX=076C  BX=0000  CX=0024  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0005   NV UP EI PL NZ NA PO NC
076A:0005 A10200        MOV     AX,[0002]                       DS:0002=0256
-t

AX=0256  BX=0000  CX=0024  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0008   NV UP EI PL NZ NA PO NC
076A:0008 8B1E0000      MOV     BX,[0000]                       DS:0000=0120
-t

AX=0256  BX=0120  CX=0024  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000C   NV UP EI PL NZ NA PO NC
076A:000C F7F3          DIV     BX
-t

AX=0002  BX=0120  CX=0024  DX=0016  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000E   NV UP EI PL NZ NA PO NC
076A:000E A30400        MOV     [0004],AX                       DS:0004=36E8
-t

AX=0002  BX=0120  CX=0024  DX=0016  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0011   NV UP EI PL NZ NA PO NC
076A:0011 89160600      MOV     [0006],DX                       DS:0006=7227
-
```

```
-d 076C:0000
076C:0000  20 01 56 02 02 00 16 00-39 E8 AA 24 06 1E 89 46    .V.....9..$...F
076C:0010  FE 89 5E FC 50 55 8B EC-C7 46 02 00 00 5D 50 55   ..^.PU...F...]PU
```

Question 5: Program for division of signed 8-bit numbers.

```
;Author: KRHero
;IDE: VSCode

.model small
.stack 256

.data
num1 db 82h
num2 dw 256h
quotient db ?
remainder db ?

.code
start:
mov ax,@data
mov ds,ax

mov ax, num2
mov bl, num1
idiv bl

mov quotient,al
mov remainder,ah


mov ah,4ch
int 21
end start
```

```
AX=0256  BX=0000  CX=0023  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0008   NV UP EI PL NZ NA PO NC
076A:0008 8A1E0000      MOV     BL,[0000]                       DS:0000=82
-t

AX=0256  BX=0082  CX=0023  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000C   NV UP EI PL NZ NA PO NC
076A:000C F6FB          IDIV    BL
-t

AX=5EFC  BX=0082  CX=0023  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000E   NV UP EI PL NZ NA PO NC
076A:000E A20300        MOV     [0003],AL                       DS:0003=FB
-t

AX=5EFC  BX=0082  CX=0023  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0011   NV UP EI PL NZ NA PO NC
076A:0011 88260400      MOV     [0004],AH                       DS:0004=E8
-t

AX=5EFC  BX=0082  CX=0023  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0015   NV UP EI PL NZ NA PO NC
076A:0015 B44C          MOV     AH,4C
-
```

```
-d 076C:0000
076C:0000  82 56 02 FC 5E 36 27 72-39 E8 AA 24 06 1E 89 46   .V..^6'r9..$...F
076C:0010  FE 89 5E FC 50 55 8B EC-C7 46 02 00 00 5D 50 55   ..^.PU...F...]PU
076C:0020  8B EC C7 46 02 00 00 5D-FF 5E FC 83 C4 04 1E 07   ...F...].^......
```

Question 6: Program for division of signed 16-bit numbers.

```
;Author: KRHero
;IDE: VSCode

.model small
.stack 256

.data
num1 dw 120h
num2 dw -256h
quotient dw ?
remainder dw ?

.code
start:
mov ax,@data
mov ds,ax

mov ax, num2
mov bx, num1
idiv bx

mov word ptr quotient,ax
mov word ptr remainder,dx


mov ah,4ch
int 21
end start
```

```
AX=FDAA  BX=0120  CX=0024  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000C   NV UP EI PL NZ NA PO NC
076A:000C F7FB          IDIV    BX
-t

AX=00E1  BX=0120  CX=0024  DX=008A  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000E   NV UP EI PL NZ NA PO NC
076A:000E A30400        MOV     [0004],AX                       DS:0004=36E8
-t

AX=00E1  BX=0120  CX=0024  DX=008A  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0011   NV UP EI PL NZ NA PO NC
076A:0011 89160600      MOV     [0006],DX                       DS:0006=7227
-t
```

```
-d 076C:0000
076C:0000  20 01 AA FD E1 00 8A 00-39 E8 AA 24 06 1E 89 46    .......9..$...F
076C:0010  FE 89 5E FC 50 55 8B EC-C7 46 02 00 00 5D 50 55   ..^.PU...F...]PU
076C:0020  8B EC C7 46 02 00 00 5D-FF 5E FC 83 C4 04 1F 07   ...F...].^......
```

Question 7: Program for data transfer using different addressing modes.

```
;Author: KRHero
;IDE: VSCode

.model small
.stack 256

.data
num1 dw ?

.code
start:
mov ax,@data
mov ds,ax

;Immediate Addressing
MOV AX, 2000H

;Register Addressing
mov BX, AX

;Displacement or Direct Mode Addressing
mov [num1],BX

;Register Indirect Mode Addressing
MOV AX, [SI+2000]

;Base Indexed Mode Addressing
MOV AL, [BP+ 0100]

;Base Indexed Displacement Mode Addressing
mov AL, [SI+BP+2000]




mov ah,4ch
int 21
end start
```

```
076A:0005 B80020        MOV     AX,2000
-t

AX=2000  BX=0000  CX=001D  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0008   NV UP EI PL NZ NA PO NC
076A:0008 8BD8          MOV     BX,AX
-t

AX=2000  BX=2000  CX=001D  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000A   NV UP EI PL NZ NA PO NC
076A:000A 891E0000      MOV     [0000],BX                       DS:0000=8338
-t

AX=2000  BX=2000  CX=001D  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=000E   NV UP EI PL NZ NA PO NC
076A:000E 8B84D007      MOV     AX,[SI+07D0]                    DS:07D0=000E
-t

AX=000E  BX=2000  CX=001D  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0012   NV UP EI PL NZ NA PO NC
```

```
076A:0012 8A4664        MOV     AL,[BP+64]                      SS:0064=08
-t

AX=0008  BX=2000  CX=001D  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0015   NV UP EI PL NZ NA PO NC
076A:0015 8A82D007      MOV     AL,[BP+SI+07D0]                 SS:07D0=1B
-t

AX=001B  BX=2000  CX=001D  DX=0000  SP=0100  BP=0000  SI=0000  DI=0000
DS=076C  ES=075A  SS=076D  CS=076A  IP=0019   NV UP EI PL NZ NA PO NC
```

Question 8: Program to move data from source to destination using indirect addressing mode (Block Move without overlap).

```
;Author: KRHero
;IDE: VSCode

.model small
.stack 256

.data
cnt db 05h
num1 dw 1450h,2450h,2123h,7568h,8920h
num2 dw ?

.code
start:
mov ax,@data
mov ds,ax

mov BL,cnt
mov SI,0000h

loop1:
mov AX,[num1 + SI]
mov [num2 + SI],AX
inc SI
inc SI
DEC BL
JZ exit
JMP loop1

exit:
mov ah,4ch
int 21
end start
```

```
-d 076C:0000
076C:0000  05 50 14 50 24 23 21 68-75 20 89 50 14 50 24 23   .P.P$#!hu .P.P$#
076C:0010  21 68 75 20 89 55 8B EC-C7 46 02 00 00 5D 50 55   !hu .U...F...]PU
```

Question 9: Program to move a block of data from source to destination (With overlap in either direction).

```
;Author: KRHero
;IDE: VSCode

.model small
.stack 256

.data
cnt db 05h
num1 dw 1450h,2450h,2123h,7568h,8920h
num2 dw ?

.code
start:
mov ax,@data
mov ds,ax

mov BL,cnt

mov SI,0000h

ADD SI,BX
ADD SI,BX

loop1:
DEC SI
DEC SI
mov AX,[num1 + SI]
mov [num2 + SI],AX
DEC BL
JZ exit
JMP loop1

exit:
mov ah,4ch
int 21
end start
```

```
-d 076D:0000
076D:0000  05 50 14 50 24 23 21 68-75 20 89 50 14 50 24 23    .P.P$#!hu .P.P$#
076D:0010  21 68 75 20 89 00 00 5D-FF 5E FC 83 C4 04 1F 07    !hu ...].^......
```

Question 10: Program to interchange two blocks of data.

```
;Author: KRHero
;IDE: VSCode

.model small
.stack 256

.data
cnt db 05h
num1 dw 1450h,2450h,2123h,7568h,8920h
num2 dw 1025h,0768h,1650h,247h,3604h

.code
start:
mov ax,@data
mov ds,ax

mov BL,cnt
mov SI,0000h

loop1:
mov AX,[num1 + SI]
mov CX,[num2 + SI]
mov [num2 + SI],AX
mov [num1 + SI],CX
inc SI
inc SI
DEC BL
JZ exit
JMP loop1

exit:
mov ah,4ch
int 21
end start
```

```
-d 076D:0000
076D:0000  05 25 10 68 07 50 16 47-02 04 36 50 14 50 24 23   .%.h.P.G..6P.P$#
076D:0010  21 68 75 20 89 00 00 5D-FF 5E FC 83 C4 04 1F 07   !hu ...].^......
076D:0020  E8 4E 24 26 C6 06 47 00-00 F8 BA 00 00 8B E5 5D   .N$&..G........]
```