HW8

1.

```
mov  cl, 1          al = ??
mov  al, 12h        al = 12h
rol  al, cl         al = 24h
mov  al, 34h        al = 34h
mov  cl, 2          al = 34h
ror  al, cl         al = 0Dh
stc                 al = 0Dh
mov  al, 56h        al = 56h
mov  cl, 3          al = 56h
rcl  al, cl         al = B5h
stc                 al = B5h
mov  al, 78h        al = 78h
mov  cl, 1          al = 78h
rcr  al, cl         al = BCh
```
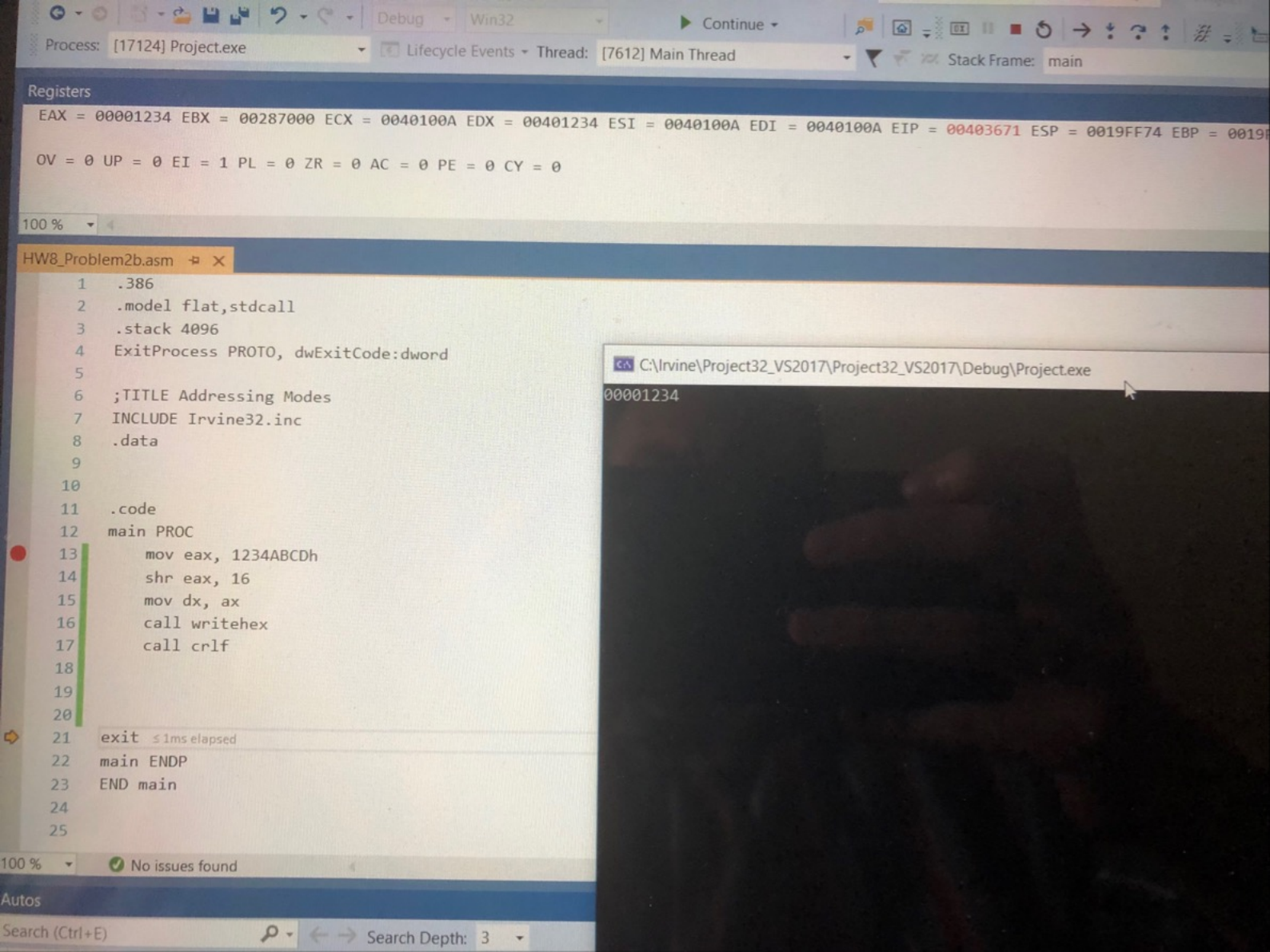
2. a)

```
mov  ax, ??       ; whatever number you want to multiply by 24
mov  dx, ax
shl  dx, 4        ; ax * 16
push edx          ; save it
mov  ax, dx
shl  ax, 2        ; ax * 4
shl  dx, 3        ; ax * 8
add  ax, dx       ; ax * 12
pop  edx          ; recalling ax * 16
add  ax, dx       ; ax * 24
```

b) SEE SCREENSHOT

Debug ▾ Win32 ▾   ▶ Continue ▾

Registers

EAX = 00001234 EBX = 00287000 ECX = 0040100A EDX = 00401234 ESI = 0040100A EDI = 0040100A EIP = 00403671 ESP = 0019FF74 EBP = 0019F

OV = 0 UP = 0 EI = 1 PL = 0 ZR = 0 AC = 0 PE = 0 CY = 0

100 %

HW8_Problem2b.asm ⊹ ✕

```
 1    .386
 2    .model flat,stdcall
 3    .stack 4096
 4    ExitProcess PROTO, dwExitCode:dword
 5
 6    ;TITLE Addressing Modes
 7    INCLUDE Irvine32.inc
 8    .data
 9
10
11    .code
12    main PROC
13        mov eax, 1234ABCDh
14        shr eax, 16
15        mov dx, ax
16        call writehex
17        call crlf
18
19
20
21    exit  ≤ 1ms elapsed
22    main ENDP
23    END main
24
25
```

C:\Irvine\Project32_VS2017\Project32_VS2017\Debug\Project.exe

00001234

100 %   ✓ No issues found

Autos

Search (Ctrl+E)   ⌕ ▾   ← → Search Depth: 3 ▾

3. a) $ax = 8642h$

   $dx = 0246h$

   If you don't set dx to 0 it may give you an
   incorrect answer if the product is too small

   b) An overflow is caused by the quotient being
   larger than a doubleword resulting in it not fitting
   in $dx:ax$

   ```
   mov  dx, 0067h
   mov  ax, 6002h
   mov  bx, 10h
   idiv bx
   ```

   c) $dx:ax = FFFF:FFFE$

   This would be useful in a 16-bit computer because
   it subtracts the upper and lower half including the carry
   flag

HW8_Problem2b.asm ⊟ ✕

```asm
 9
10    .code
11    main PROC
12        call ReadInt
13        mov bx, ax
14        mov ecx, 16
15    L1:
16        shl bx, 1
17        jc L2
18        jnc L3
19    L2:
20        mov eax, 1
21        call WriteDec
22        loop L1
23        exit
24    L3:
25        mov eax, 0
26        call WriteDec
27        loop L1
28
29
30
31
32    exit
33    main ENDP
34    END main
35
36
```

100 %   ▼   ✓ No issues found

Output

Microsoft Visual Studio Debug Console

```
15
0000000000001111
C:\Irvine\Project32_VS2017\Project32_VS2017\Debug\Project.exe
To automatically close the console when debugging stops, enabl
le when debugging stops.
Press any key to close this window . . .
```

Debug   Win32   ▶ Local Windows Debugger

HW8_Problem2b.asm ⊕ ✕

```asm
 9
10      .code
11     main PROC
12         call ReadInt
13         mov bx, ax
14         mov ecx, 16
15     L1:
16         shl bx, 1
17         jc L2
18         jnc L3
19     L2:
20         mov eax, 1
21         call WriteDec
22         loop L1
23         exit
24     L3:
25         mov eax, 0
26         call WriteDec
27         loop L1
28
29
30
31
32      exit
33     main ENDP
34     END main
35
36
```

100 % ⊘ No issues found

Output

Microsoft Visual Studio Debug Console

```
1234
0000010011010010
C:\Irvine\Project32_VS2017\Project32_VS2017\Debug\Project.exe (process
To automatically close the console when debugging stops, enable Tools-
le when debugging stops.
Press any key to close this window . . .
```
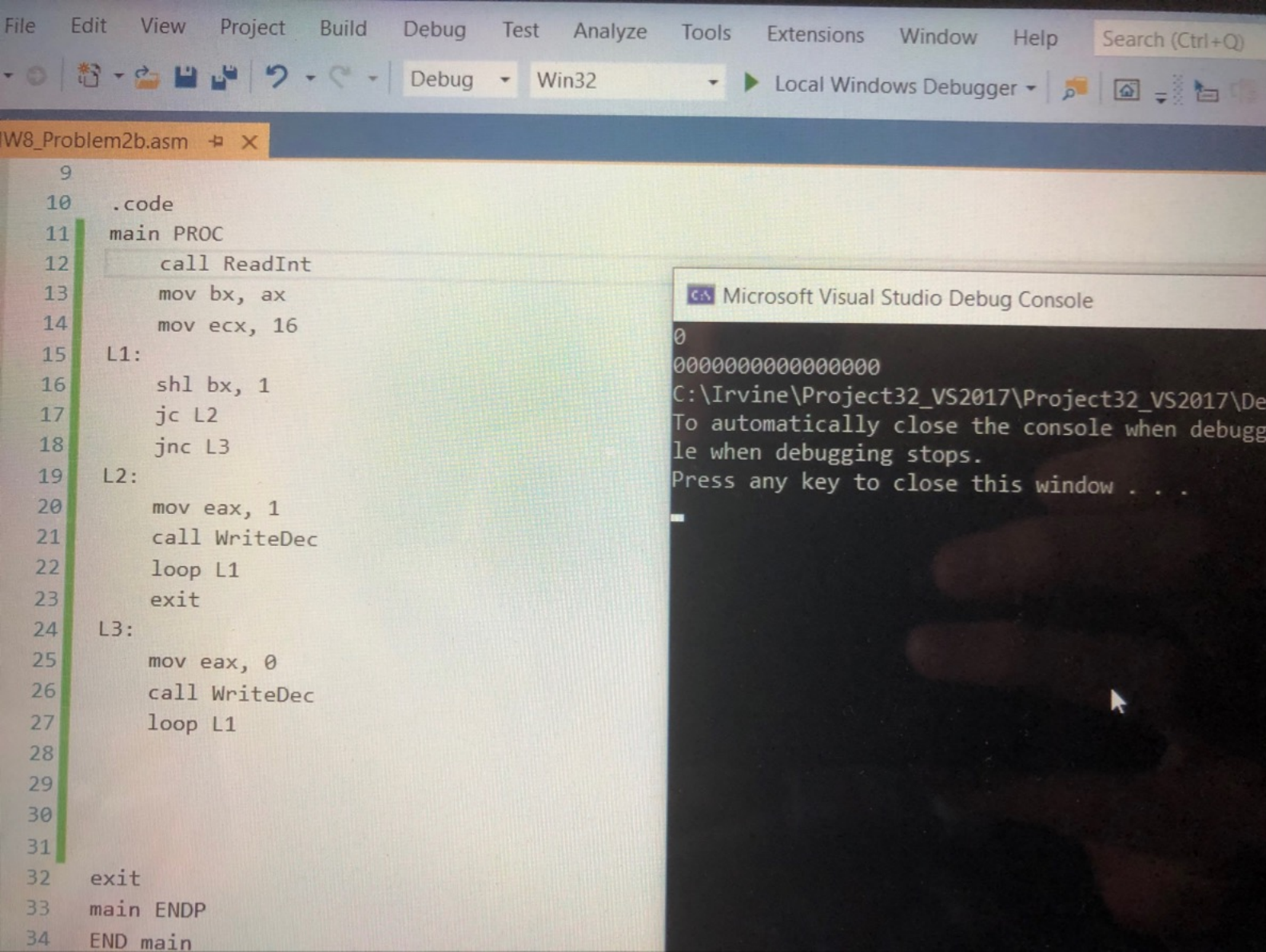
Debug   ▾   Win32   ▾   ▶ Local Windows Debugger ▾

W8_Problem2b.asm   ⊣ ✕

```
 9
10    .code
11    main PROC
12        call ReadInt
13        mov bx, ax
14        mov ecx, 16
15    L1:
16        shl bx, 1
17        jc L2
18        jnc L3
19    L2:
20        mov eax, 1
21        call WriteDec
22        loop L1
23        exit
24    L3:
25        mov eax, 0
26        call WriteDec
27        loop L1
28
29
30
31
32    exit
33    main ENDP
34    END main
```

Microsoft Visual Studio Debug Console

```
0
0000000000000000
C:\Irvine\Project32_VS2017\Project32_VS2017\De
To automatically close the console when debugg
le when debugging stops.
Press any key to close this window . . .
```

HW8_Problem4.asm ⊣ X

```
 8      .data
 9          Apple QWORD 1111222233334444h
10          Berry QWORD 13572468ABCD0000h
11          Cherry QWORD ?
12          ph WORD 0
13
14      .code
15      main PROC
16          mov dx, 0
17          mov ax, WORD PTR Apple
18          mov bx, WORD PTR Berry
19          add ax, bx
20          adc dx, 0
21          mov WORD PTR Cherry, ax
22
23          mov ax, WORD PTR [Apple + 2]
24          mov ax, WORD PTR [Berry + 2]
25          add ax, dx
26          mov dx, 0
27          add ax, bx
28          adc dx, 0
29          mov WORD PTR [Cherry + 2], ax
30
31          mov ax, WORD PTR [Apple + 4]
32          mov ax, WORD PTR [Berry + 4]
33          add ax, dx
34          mov dx, 0
35          add ax, bx
36          adc dx, 0
37          mov WORD PTR [Cherry + 4], ax
38
39          mov ax, WORD PTR [Apple + 6]
40          mov ax, WORD PTR [Berry + 6]
41          add ax, dx
42          mov dx, 0
43          add ax, bx
```

```
30
31        mov ax, WORD PTR [Apple + 4]
32        mov ax, WORD PTR [Berry + 4]
33        add ax, dx
34        mov dx, 0
35        add ax, bx
36        adc dx, 0
37        mov WORD PTR [Cherry + 4], ax
38
39        mov ax, WORD PTR [Apple + 6]
40        mov ax, WORD PTR [Berry + 6]
41        add ax, dx
42        mov dx, 0
43        add ax, bx
44        adc dx, 0
45        mov WORD PTR [Cherry + 6], ax
46
47        mov ebx, TYPE ph
48        movzx eax, WORD PTR [Cherry + 6]
49        call WriteHexB
50        movzx eax, WORD PTR [Cherry + 4]
51        call WriteHexB
52        movzx eax, WORD PTR [Cherry + 2]
53        call WriteHexB
54        movzx eax, WORD PTR Cherry
55        call WriteHexB
56        call Crlf
57
58    exit
59    main ENDP
60    END main
61
62
```

Microsoft Visual Studio Debug Console

13572468ABCD4444

C:\Irvine\Project32_VS2017\Project32_VS2017\Debug\Project.exe (p
To automatically close the console when debugging stops, enable
le when debugging stops.
Press any key to close this window . . .