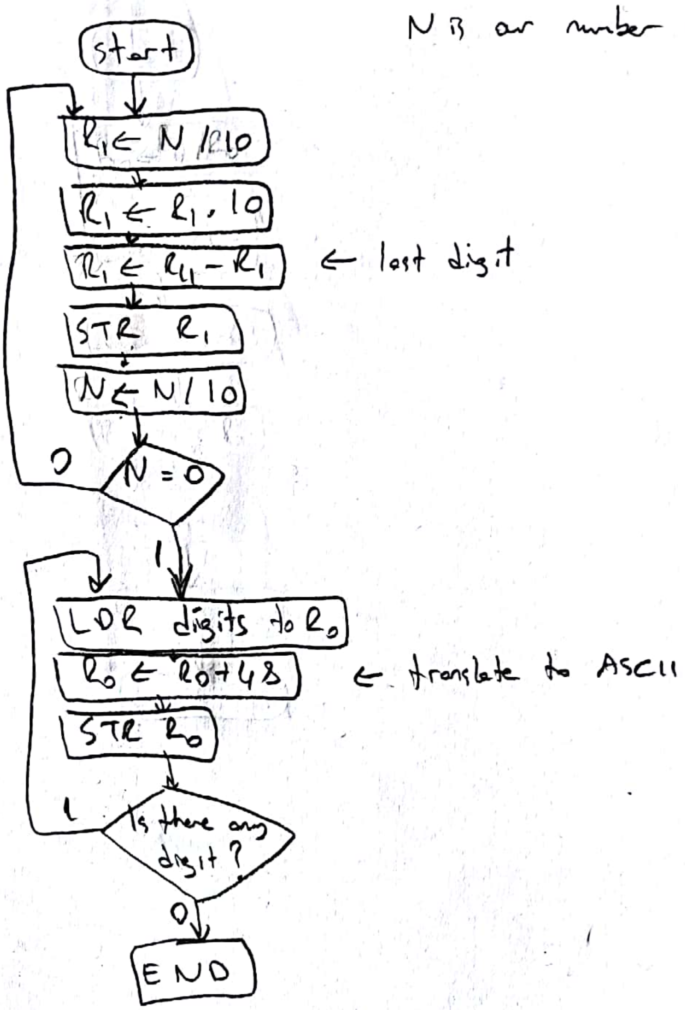
EE447 - Preliminary 1

Efe Berkay Yitim
2305761

Q1)

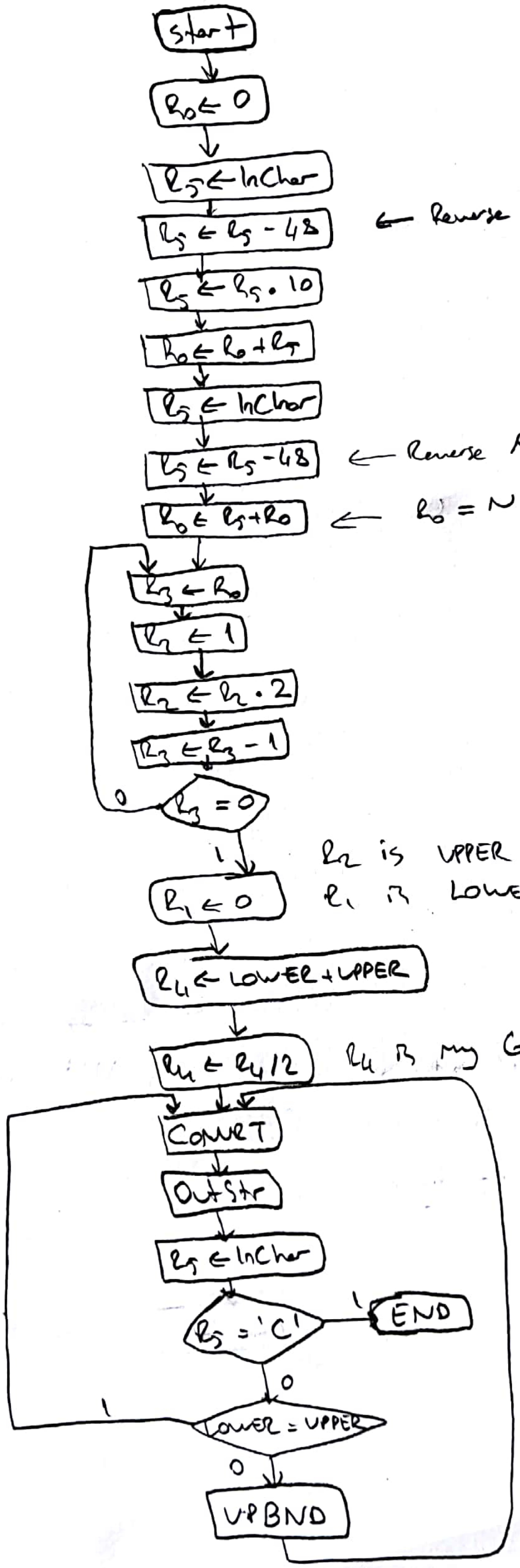
N is our number to be converted.



Q2) CONVRT subratine that I wrote expects the number to be converted is stored in R_4 and the begining of the address that our converted digits should be written to is stored in R_5.

I pass R_4 by value and R_5 by reference.

Q3)



← Reverse ASCII

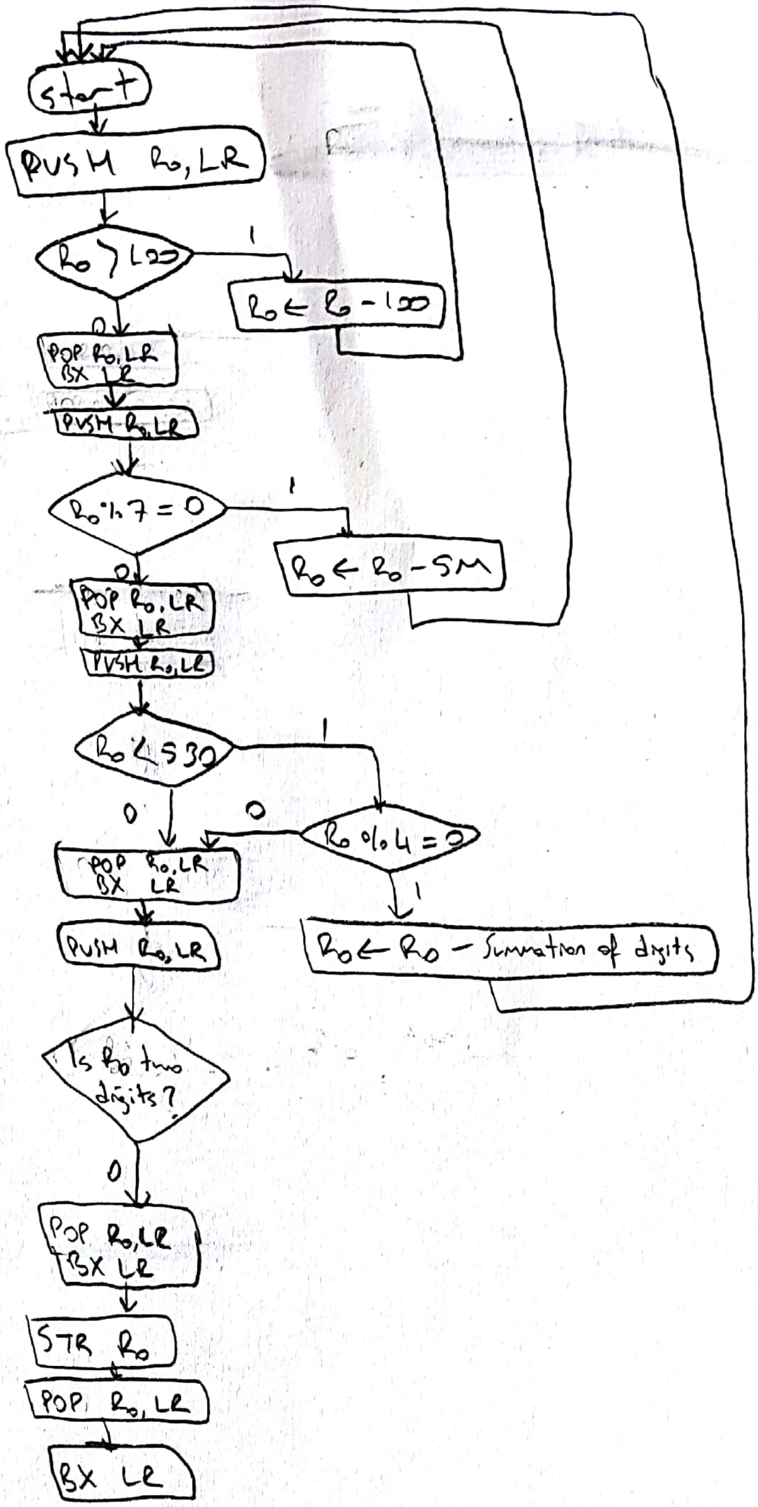
← Reverse ASCII

← R0 = N

R2 is UPPER bound
R1 is LOWER bound

R4 is my GUESS

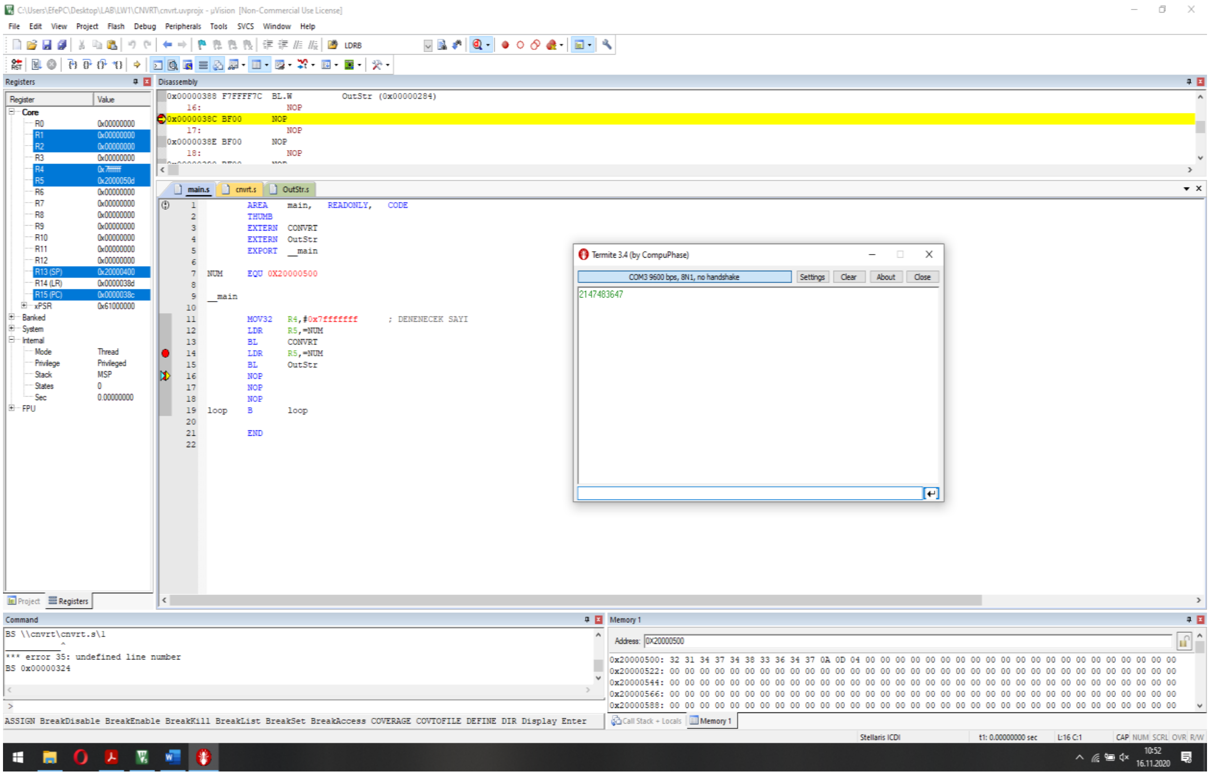
Q4)


start
PUSH R0, LR
R0 > 100
1
R0 ← R0 - 100
0
POP R0, LR
BX LR
PUSH R0, LR
R0 % 7 = 0
1
R0 ← R0 - SM
0
POP R0, LR
BX LR
PUSH R0, LR
R0 < 530
1
0
0
R0 % 4 = 0
1
R0 ← R0 - Summation of digits
POP R0, LR
BX LR
PUSH R0, LR
Is R0 two digits?
0
POP R0, LR
BX LR
STR R0
POP R0, LR
BX LR

Efe Berkay Yitim
2305761

Q1)

NUMBER IS 0X2FFFFFFF



Register	Value
Core	
R0	0x00000000
R1	0x00000000
R2	0x00000000
R3	0x00000000
R4	0x7fffffff
R5	0x2000050d
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x00000000
R13 (SP)	0x20000400
R14 (LR)	0x0000038d
R15 (PC)	0x0000038c
xPSR	0x61000000
Banked	
System	
Internal	
Mode	Thread
Privilege	Privileged
Stack	MSP
States	0
Sec	0.00000000
FPU	

```
0x00000388 F7FFFF7C  BL.W        OutStr (0x00000284)
    16:              NOP
0x0000038C BF00      NOP
    17:              NOP
0x0000038E BF00      NOP
    18:              NOP
```

```
        AREA    main,   READONLY,   CODE
        THUMB
        EXTERN  CONVRT
        EXTERN  OutStr
        EXPORT  __main

NUM     EQU 0X20000500

__main

        MOV32   R4,#0x7fffffff      ; DENENECEK SAYI
        LDR     R5,=NUM
        BL      CONVRT
        LDR     R5,=NUM
        BL      OutStr
        NOP
        NOP
        NOP
loop    B       loop

        END
```

COM3 9600 bps, 8N1, no handshake

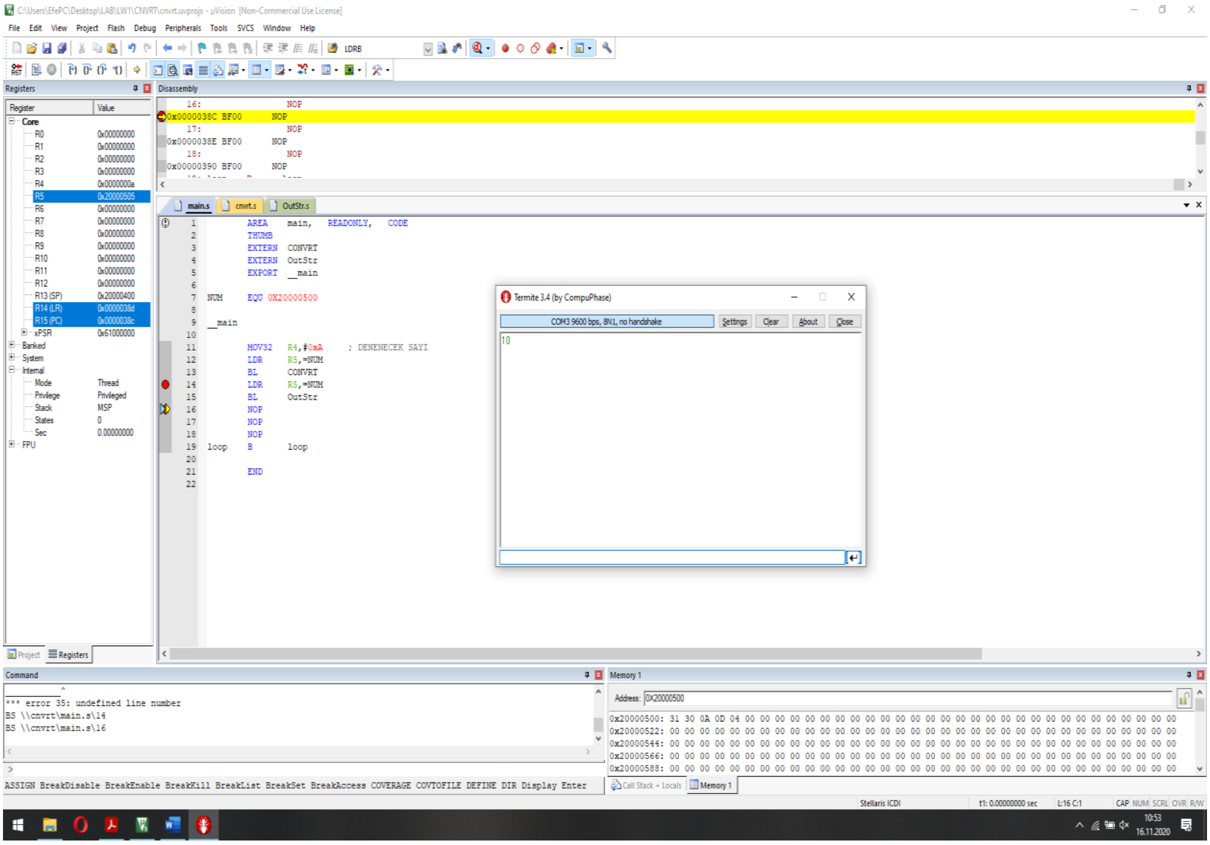
```
2147483647
```

```
BS \\cnvrt\cnvrt.s\1
           ^
*** error 35: undefined line number
BS 0x00000324
>
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE COVTOFILE DEFINE DIR Display Enter
```

Address: 0X20000500

```
0x20000500: 32 31 34 37 34 38 33 36 34 37 0A 0D 04 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000522: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000544: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000566: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000588: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

NUMBER IS 0XA



Register	Value
Core	
R0	0x00000000
R1	0x00000000
R2	0x00000000
R3	0x00000000
R4	0x0000000a
R5	0x20000505
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x00000000
R13 (SP)	0x20000400
R14 (LR)	0x0000038d
R15 (PC)	0x0000038c
xPSR	0x61000000
Banked	
System	
Internal	
Mode	Thread
Privilege	Privileged
Stack	MSP
States	0
Sec	0.00000000
FPU	

```
    16:              NOP
0x0000038C BF00      NOP
    17:              NOP
0x0000038E BF00      NOP
    18:              NOP
0x00000390 BF00      NOP
```

```
        AREA    main,   READONLY,   CODE
        THUMB
        EXTERN  CONVRT
        EXTERN  OutStr
        EXPORT  __main

NUM     EQU 0X20000500

__main

        MOV32   R4,#0xA     ; DENENECEK SAYI
        LDR     R5,=NUM
        BL      CONVRT
        LDR     R5,=NUM
        BL      OutStr
        NOP
        NOP
        NOP
loop    B       loop

        END
```

COM3 9600 bps, 8N1, no handshake

```
10
```

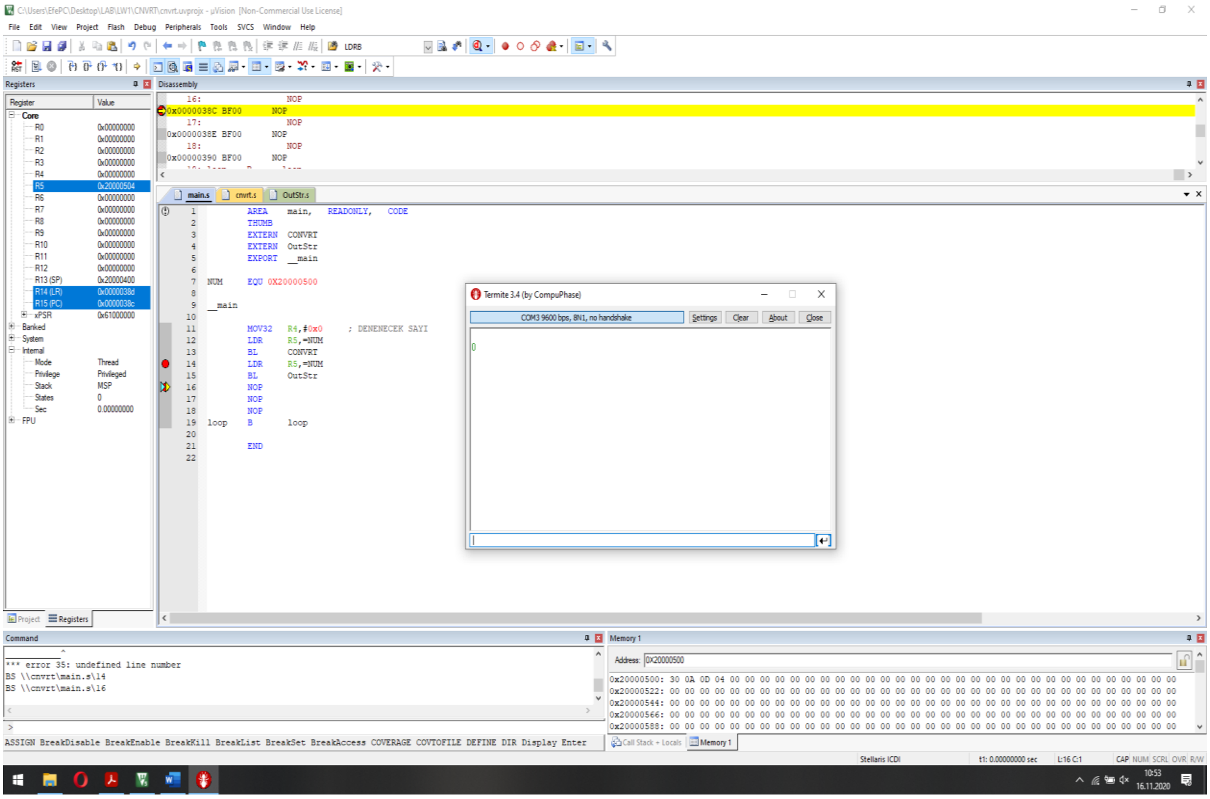
```
           ^
*** error 35: undefined line number
BS \\cnvrt\main.s\14
BS \\cnvrt\main.s\16
>
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE COVTOFILE DEFINE DIR Display Enter
```

Address: 0X20000500

```
0x20000500: 31 30 0A 0D 04 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000522: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000544: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000566: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000588: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Efe Berkay Yitim
2305761

NUMBER IS 0X0



C:\Users\EfePC\Desktop\LAB\LW1\CNVRT\cnvrt.uvprojx - µVision [Non-Commercial Use License]

Register	Value
R0	0x00000000
R1	0x00000000
R2	0x00000000
R3	0x00000000
R4	0x00000000
R5	0x20000504
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x00000000
R13 (SP)	0x20000400
R14 (LR)	0x0000038d
R15 (PC)	0x0000038c
xPSR	0x61000000
Mode	Thread
Privilege	Privileged
Stack	MSP
States	0
Sec	0.00000000

Disassembly

```
    16:                NOP
0x0000038C BF00      NOP
    17:                NOP
0x0000038E BF00      NOP
    18:                NOP
0x00000390 BF00      NOP
```

main.s

```
        AREA    main,   READONLY,   CODE
        THUMB
        EXTERN  CONVRT
        EXTERN  OutStr
        EXPORT  __main

NUM     EQU 0X20000500

__main

        MOV32   R4,#0x0     ; DENENECEK SAYI
        LDR     R5,=NUM
        BL      CONVRT
        LDR     R5,=NUM
        BL      OutStr
        NOP
        NOP
        NOP
loop    B       loop

        END
```

Termite 3.4 (by CompuPhase) — COM3 9600 bps, 8N1, no handshake

```
0
```

Command

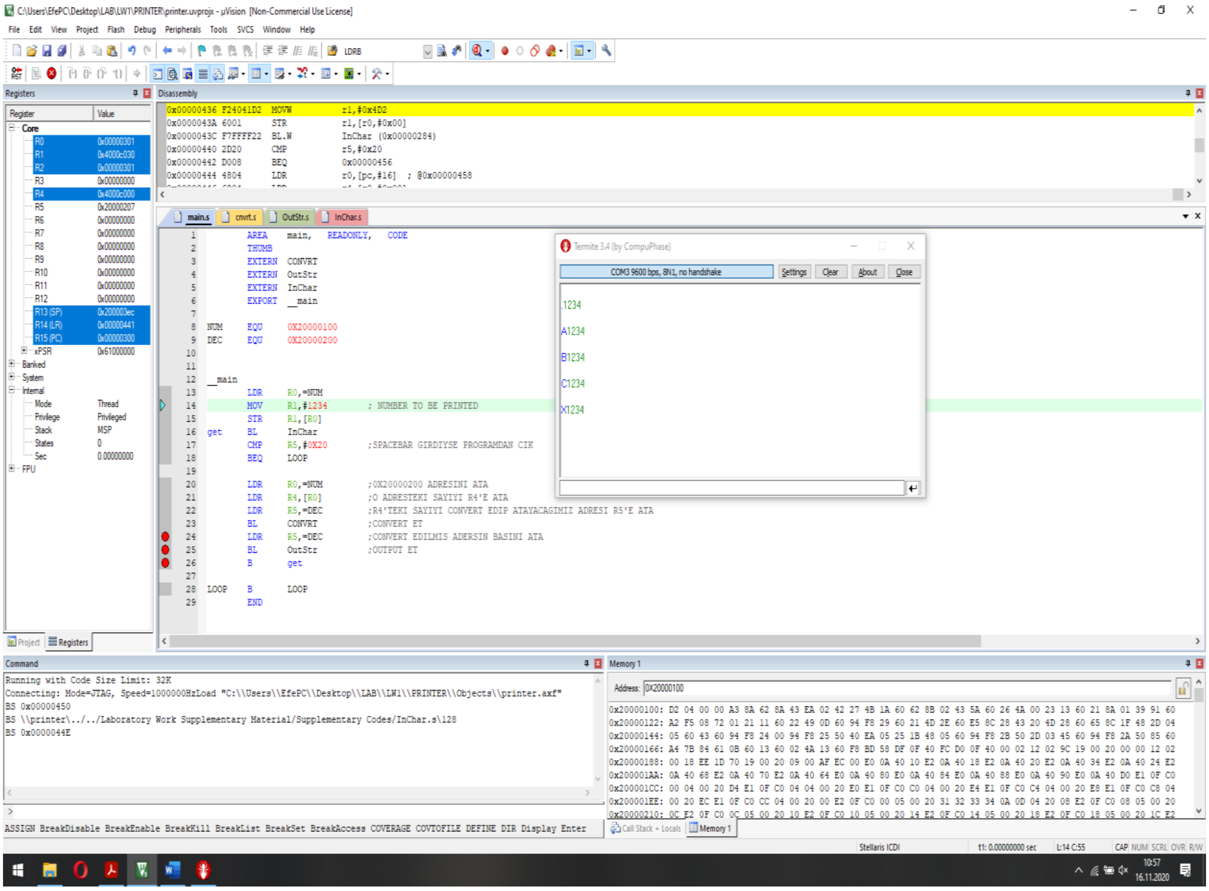
```
*** error 35: undefined line number
BS \\cnvrt\main.s\14
BS \\cnvrt\main.s\16
```

Memory 1 — Address: 0X20000500

```
0x20000500: 30 0A 0D 04 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000522: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000544: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000566: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20000588: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Stellaris ICDI t1: 0.00000000 sec L:16 C:1 — 10:53 16.11.2020

Q2)



C:\Users\EfePC\Desktop\LAB\LW1\PRINTER\printer.uvprojx - µVision [Non-Commercial Use License]

Register	Value
R0	0x00000301
R1	0x4000c030
R2	0x00000301
R3	0x00000000
R4	0x4000c000
R5	0x20000207
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x00000000
R13 (SP)	0x200003ec
R14 (LR)	0x00000441
R15 (PC)	0x00000300
xPSR	0x61000000
Mode	Thread
Privilege	Privileged
Stack	MSP
States	0
Sec	0.00000000

Disassembly

```
0x00000436 F24041D2  MOVW        r1,#0x4D2
0x0000043A 6001      STR         r1,[r0,#0x00]
0x0000043C F7FFFF22  BL.W        InChar (0x00000284)
0x00000440 2D20      CMP         r5,#0x20
0x00000442 D008      BEQ         0x00000456
0x00000444 4804      LDR         r0,[pc,#16]  ; @0x00000458
```

main.s

```
        AREA    main,   READONLY,   CODE
        THUMB
        EXTERN  CONVRT
        EXTERN  OutStr
        EXTERN  InChar
        EXPORT  __main

NUM     EQU     0X20000100
DEC     EQU     0X20000200


__main
        LDR     R0,=NUM
        MOV     R1,#1234        ; NUMBER TO BE PRINTED
        STR     R1,[R0]
get     BL      InChar
        CMP     R5,#0X20        ;SPACEBAR GIRDIYSE PROGRAMDAN CIK
        BEQ     LOOP

        LDR     R0,=NUM         ;0X20000200 ADRESINI ATA
        LDR     R4,[R0]         ;O ADRESTEKI SAYIYI R4'E ATA
        LDR     R5,=DEC         ;R4'TEKI SAYIYI CONVERT EDIP ATAYACAGIMIZ ADRESI R5'E ATA
        BL      CONVRT          ;CONVERT ET
        LDR     R5,=DEC         ;CONVERT EDILMIS ADERSIN BASINI ATA
        BL      OutStr          ;OUTPUT ET
        B       get

LOOP    B       LOOP
        END
```

Termite 3.4 (by CompuPhase) — COM3 9600 bps, 8N1, no handshake

```
1234
A1234
B1234
C1234
X1234
```

Command

```
Running with Code Size Limit: 32K
Connecting: Mode=JTAG, Speed=1000000HzLoad "C:\\Users\\EfePC\\Desktop\\LAB\\LW1\\PRINTER\\Objects\\printer.axf"
BS 0x00000450
BS \\printer\../../Laboratory Work Supplementary Material/Supplementary Codes/InChar.s\128
BS 0x0000044E
```

Memory 1 — Address: 0X20000100

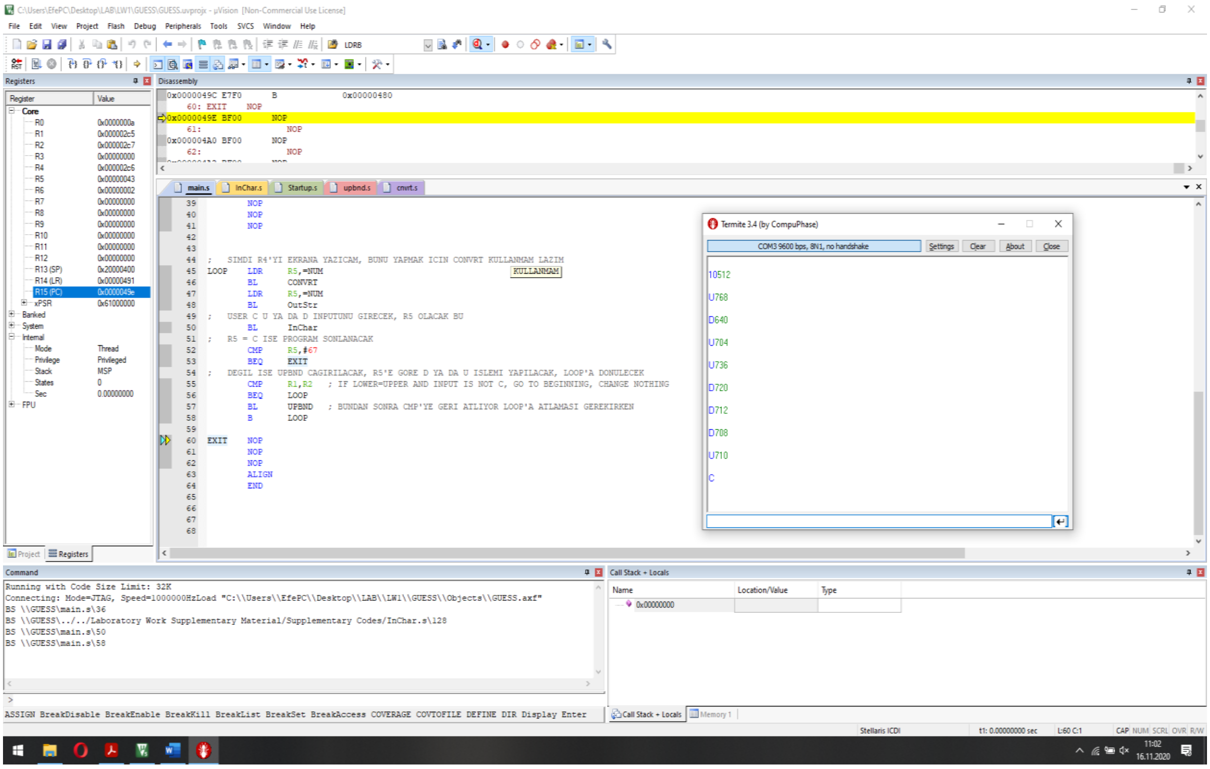
```
0x20000100: D2 04 00 00 A3 8A 62 8A 43 EA 02 42 27 4B 1A 60 62 8B 02 43 5A 60 26 4A 00 23 13 60 21 8A 01 39 91 60
0x20000122: A2 F5 08 72 01 21 11 60 22 49 0D 60 94 F8 29 60 21 4D 2E 60 E5 8C 28 43 20 4D 28 60 65 8C 1F 48 2D 04
0x20000144: 05 60 43 60 94 F8 24 00 94 F8 25 50 40 EA 05 25 1B 48 05 60 94 F8 2B 50 2D 03 45 60 94 F8 2A 50 85 60
0x20000166: A4 7B 84 61 0B 60 13 60 02 4A 13 60 F8 BD 58 DF 0F 40 FC D0 0F 40 00 02 12 02 9C 19 00 20 00 00 12 02
0x20000188: 00 18 EE 1D 70 19 00 20 09 00 AF EC 00 E0 0A 40 10 E2 0A 40 18 E2 0A 40 20 E2 0A 40 34 E2 0A 40 24 E2
0x200001AA: 0A 40 68 E2 0A 40 70 E2 0A 40 64 E0 0A 40 80 E0 0A 40 84 E0 0A 40 88 E0 0A 40 90 E0 0A 40 D0 E1 0F C0
0x200001CC: 00 04 00 20 D4 E1 0F C0 04 04 00 20 E0 E1 0F C0 C0 04 00 20 E4 E1 0F C0 C4 04 00 20 E8 E1 0F C0 C8 04
0x200001EE: 00 20 EC E1 0F C0 CC 04 00 20 00 E2 0F C0 00 05 00 20 31 32 33 34 0A 0D 04 20 08 E2 0F C0 08 05 00 20
0x20000210: 0C E2 0F C0 0C 05 00 20 10 E2 0F C0 10 05 00 20 14 E2 0F C0 14 05 00 20 18 E2 0F C0 18 05 00 20 1C E2
```

Stellaris ICDI t1: 0.00000000 sec L:14 C:55 — 10:57 16.11.2020

Efe Berkay Yitim
2305761

Q3)

MY GUESS IS 710



C:\Users\EfePC\Desktop\LAB\LW1\GUESS\GUESS.uvprojx - µVision [Non-Commercial Use License]

```
Register        Value
Core
  R0            0x0000000a
  R1            0x000002c5
  R2            0x000002c7
  R3            0x00000000
  R4            0x000002c6
  R5            0x00000043
  R6            0x00000002
  R7            0x00000000
  R8            0x00000000
  R9            0x00000000
  R10           0x00000000
  R11           0x00000000
  R12           0x00000000
  R13 (SP)      0x20000400
  R14 (LR)      0x00000491
  R15 (PC)      0x0000049e
  xPSR          0x61000000
Banked
System
Internal
  Mode          Thread
  Privilege     Privileged
  Stack         MSP
  States        0
  Sec           0.00000000
FPU
```

```
0x0000049C E7F0      B          0x00000480
    60: EXIT    NOP
0x0000049E BF00      NOP
    61:             NOP
0x000004A0 BF00      NOP
    62:             NOP
```

```
                NOP
                NOP
                NOP


;   SIMDI R4'YI EKRANA YAZICAM, BUNU YAPMAK ICIN CONVRT KULLANMAM LAZIM
LOOP    LDR     R5,=NUM
        BL      CONVRT
        LDR     R5,=NUM
        BL      OutStr
;   USER C U YA DA D INPUTUNU GIRECEK, R5 OLACAK BU
        BL      InChar
;   R5 = C ISE PROGRAM SONLANACAK
        CMP     R5,#67
        BEQ     EXIT
;   DEGIL ISE UPBND CAGIRILACAK, R5'E GORE D YA DA U ISLEMI YAPILACAK, LOOP'A DONULECEK
        CMP     R1,R2   ; IF LOWER=UPPER AND INPUT IS NOT C, GO TO BEGINNING, CHANGE NOTHING
        BEQ     LOOP
        BL      UPBND   ; BUNDAN SONRA CMP'YE GERI ATLIYOR LOOP'A ATLAMASI GEREKIRKEN
        B       LOOP

EXIT    NOP
        NOP
        NOP
        ALIGN
        END
```

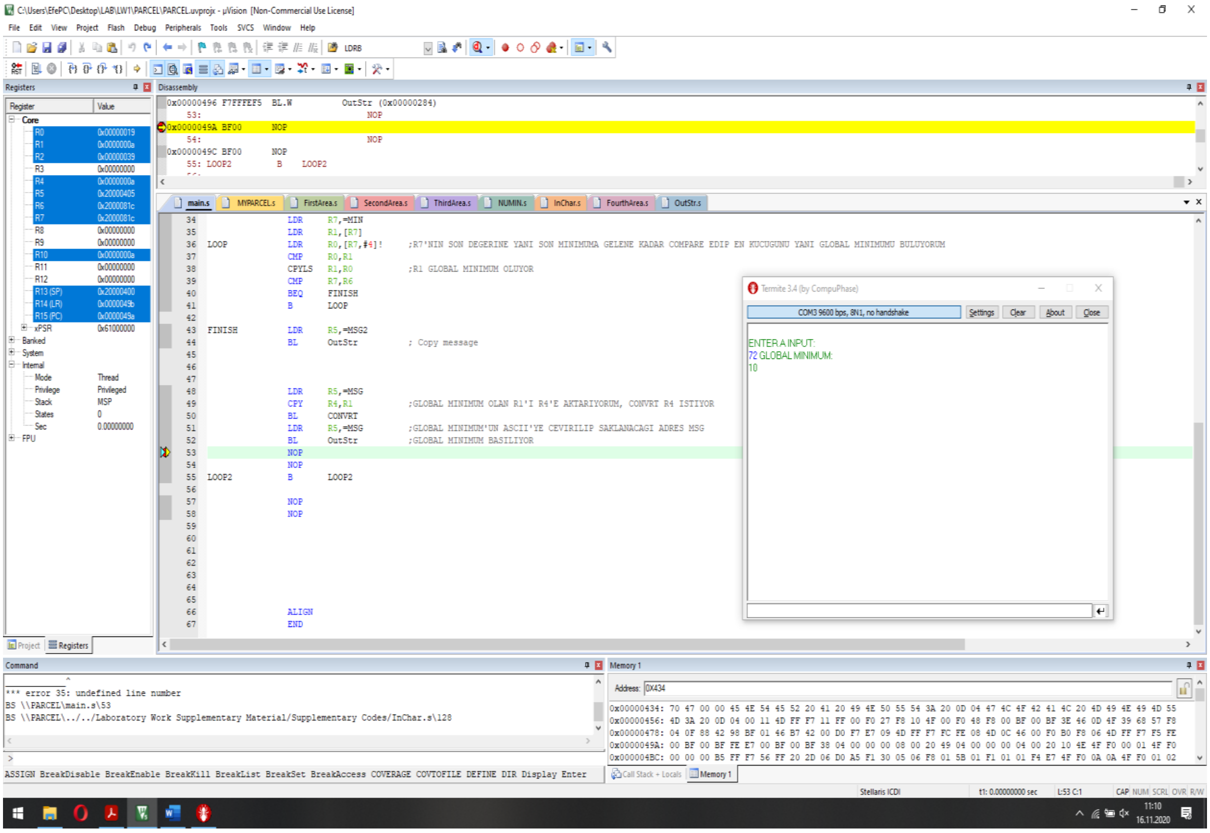
Termite 3.4 (by CompuPhase)

COM3 9600 bps, 8N1, no handshake

```
10512
U768
D640
U704
U736
D720
D712
D708
U710
C
```

```
Running with Code Size Limit: 32K
Connecting: Mode=JTAG, Speed=1000000HzLoad "C:\\Users\\EfePC\\Desktop\\LAB\\LW1\\GUESS\\Objects\\GUESS.axf"
BS \\GUESS\main.s\36
BS \\GUESS\../../Laboratory Work Supplementary Material/Supplementary Codes/InChar.s\128
BS \\GUESS\main.s\50
BS \\GUESS\main.s\58
```

Q4) 72 ---- QdI ---- 63 ---- ST ---- 18 ---- HV ---- 10



C:\Users\EfePC\Desktop\LAB\LW1\PARCEL\PARCEL.uvprojx - µVision [Non-Commercial Use License]

```
Register        Value
Core
  R0            0x00000019
  R1            0x0000000a
  R2            0x00000039
  R3            0x00000000
  R4            0x0000000a
  R5            0x20000405
  R6            0x2000081c
  R7            0x2000081c
  R8            0x00000000
  R9            0x00000000
  R10           0x0000000a
  R11           0x00000000
  R12           0x00000000
  R13 (SP)      0x20000400
  R14 (LR)      0x0000049b
  R15 (PC)      0x0000049a
  xPSR          0x61000000
Banked
System
Internal
  Mode          Thread
  Privilege     Privileged
  Stack         MSP
  States        0
  Sec           0.00000000
FPU
```

```
0x00000496 F7FFFEF5  BL.W        OutStr (0x00000284)
    53:                 NOP
0x0000049A BF00      NOP
    54:                 NOP
0x0000049C BF00      NOP
    55: LOOP2       B     LOOP2
```

```
                LDR     R7,=MIN
                LDR     R1,[R7]
LOOP            LDR     R0,[R7,#4]!     ;R7'NIN SON DEGERINE YANI SON MINIMUMA GELENE KADAR COMPARE EDIP EN KUCUGUNU YANI GLOBAL MINIMUMU BULUYORUM
                CMP     R0,R1
                CPYLS   R1,R0           ;R1 GLOBAL MINIMUM OLUYOR
                CMP     R7,R6
                BEQ     FINISH
                B       LOOP

FINISH          LDR     R5,=MSG2
                BL      OutStr          ; Copy message




                LDR     R5,=MSG
                CPY     R4,R1           ;GLOBAL MINIMUM OLAN R1'I R4'E AKTARIYORUM, CONVRT R4 ISTIYOR
                BL      CONVRT
                LDR     R5,=MSG         ;GLOBAL MINIMUM'UN ASCII'YE CEVIRILIP SAKLANACAGI ADRES MSG
                BL      OutStr          ;GLOBAL MINIMUM BASILIYOR
                NOP
                NOP
LOOP2           B       LOOP2

                NOP
                NOP









                ALIGN
                END
```

Termite 3.4 (by CompuPhase)

COM3 9600 bps, 8N1, no handshake

```
ENTER A INPUT:
72 GLOBAL MINIMUM:
10
```

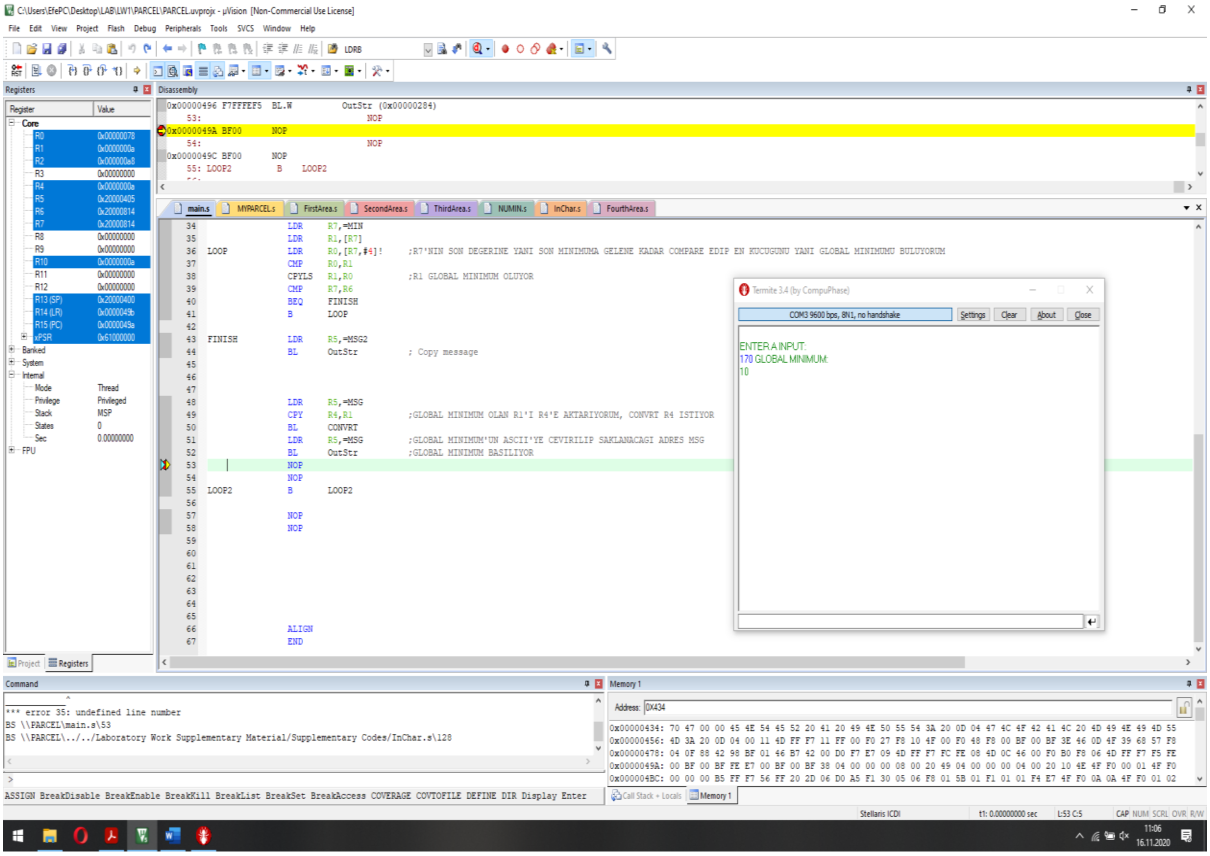
```
*** error 35: undefined line number
BS \\PARCEL\main.s\53
BS \\PARCEL\../../Laboratory Work Supplementary Material/Supplementary Codes/InChar.s\128
```

Address: 0X434

```
0x00000434: 70 47 00 00 45 4E 54 45 52 20 41 20 49 4E 50 55 54 3A 20 0D 04 47 4C 4F 42 41 4C 20 4D 49 4E 49 4D 55
0x00000456: 4D 3A 20 0D 04 00 11 4D FF F7 11 FF 00 F0 27 F8 10 4F 00 F0 48 F8 00 BF 00 BF 3E 46 0D 4F 39 68 57 F8
0x00000478: 04 0F 88 42 98 BF 01 46 B7 42 00 D0 F7 E7 09 4D FF F7 FC FE 08 4D 0C 46 00 F0 B0 F8 06 4D FF F7 F5 FE
0x0000049A: 00 BF 00 BF FE E7 00 BF 00 BF 38 04 00 00 00 08 00 20 49 04 00 00 00 04 00 20 10 4E 4F F0 00 01 4F F0
0x000004BC: 00 00 00 B5 FF F7 56 FF 20 2D 06 D0 A5 F1 30 05 06 F8 01 5B 01 F1 01 01 F4 E7 4F F0 0A 0A 4F F0 01 02
```

Efe Berkay Yitim
2305761

170 --- CB ---- 70 ---- ST ----- 20 ----- QdI ----- 18 ----- HV ----- 10



C:\Users\EfePC\Desktop\LAB\LW1\PARCEL\PARCEL.uvprojx - µVision [Non-Commercial Use License]

```
Register        Value
Core
  R0            0x00000078
  R1            0x0000000a
  R2            0x000000a8
  R3            0x00000000
  R4            0x0000000a
  R5            0x20000405
  R6            0x20000814
  R7            0x20000814
  R8            0x00000000
  R9            0x00000000
  R10           0x0000000a
  R11           0x00000000
  R12           0x00000000
  R13 (SP)      0x20000400
  R14 (LR)      0x0000049b
  R15 (PC)      0x0000049a
  xPSR          0x61000000
Banked
System
Internal
  Mode          Thread
  Privilege     Privileged
  Stack         MSP
  States        0
  Sec           0.00000000
FPU
```

Disassembly

```
0x00000496 F7FFFEF5  BL.W          OutStr (0x00000284)
    53:                             NOP
0x0000049A BF00      NOP
    54:                             NOP
0x0000049C BF00      NOP
    55: LOOP2          B    LOOP2
```

main.s

```
                LDR     R7,=MIN
                LDR     R1,[R7]
LOOP            LDR     R0,[R7,#4]!     ;R7'NIN SON DEGERINE YANI SON MINIMUMA GELENE KADAR COMPARE EDIP EN KUCUGUNU YANI GLOBAL MINIMUMU BULUYORUM
                CMP     R0,R1
                CPYLS   R1,R0           ;R1 GLOBAL MINIMUM OLUYOR
                CMP     R7,R6
                BEQ     FINISH
                B       LOOP

FINISH          LDR     R5,=MSG2
                BL      OutStr          ; Copy message



                LDR     R5,=MSG
                CPY     R4,R1           ;GLOBAL MINIMUM OLAN R1'I R4'E AKTARIYORUM, CONVRT R4 ISTIYOR
                BL      CONVRT
                LDR     R5,=MSG         ;GLOBAL MINIMUM'UN ASCII'YE CEVIRILIP SAKLANACAGI ADRES MSG
                BL      OutStr          ;GLOBAL MINIMUM BASILIYOR
                NOP
                NOP
LOOP2           B       LOOP2

                NOP
                NOP








                ALIGN
                END
```

Termite 3.4 (by CompuPhase)

COM3 9600 bps, 8N1, no handshake

```
ENTER A INPUT:
170 GLOBAL MINIMUM:
10
```

Command

```
*** error 35: undefined line number
BS \\PARCEL\main.s\53
BS \\PARCEL\../../Laboratory Work Supplementary Material/Supplementary Codes/InChar.s\128
```

Memory 1

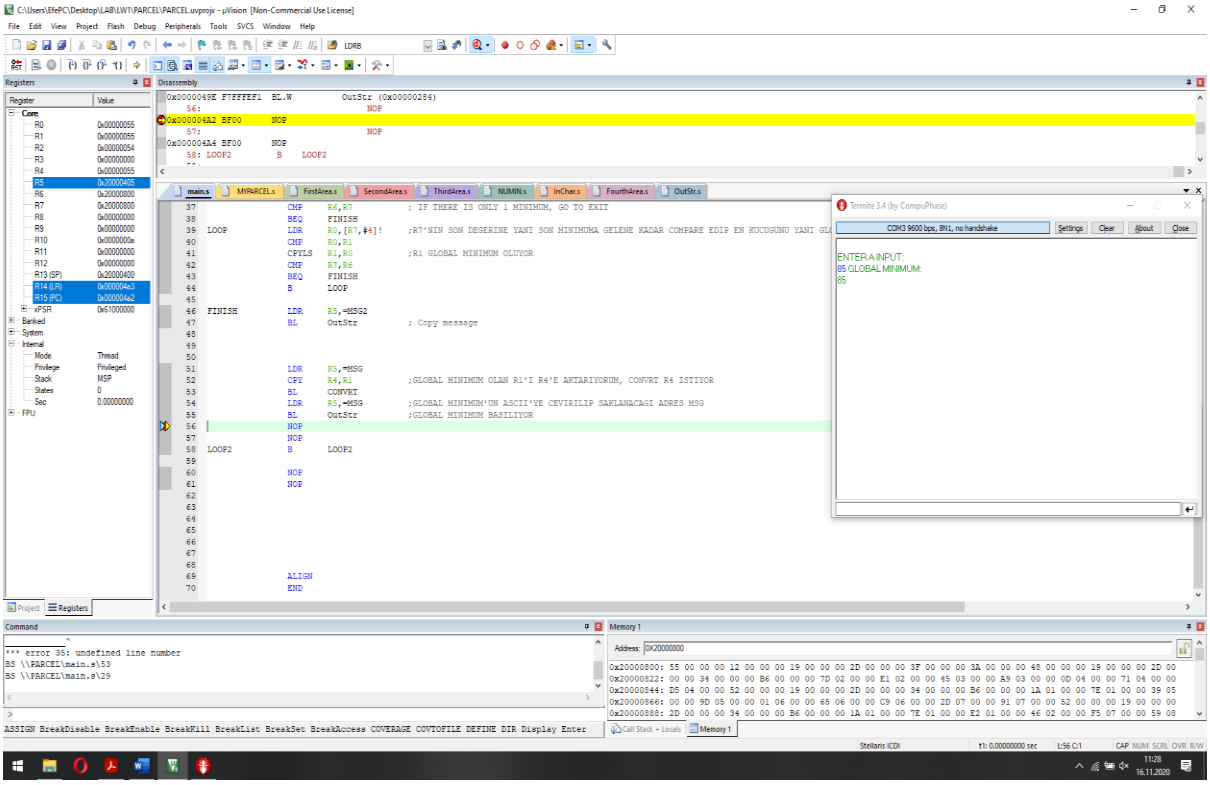
Address: 0X434

```
0x00000434: 70 47 00 00 45 4E 54 45 52 20 41 20 49 4E 50 55 54 3A 20 0D 04 47 4C 4F 42 41 4C 20 4D 49 4E 49 4D 55
0x00000456: 4D 3A 20 0D 04 00 11 4D FF F7 11 FF 00 F0 27 F8 10 4F 00 F0 48 F8 00 BF 00 BF 3E 46 0D 4F 39 68 57 F8
0x00000478: 04 0F 88 42 98 BF 01 46 B7 42 00 D0 F7 E7 09 4D FF F7 FC FE 08 4D 0C 46 00 F0 B0 F8 06 4D FF F7 F5 FE
0x0000049A: 00 BF 00 BF FE E7 00 BF 00 BF 38 04 00 00 00 08 00 20 49 04 00 00 00 04 00 20 10 4E 4F F0 00 01 4F F0
0x000004BC: 00 00 00 B5 FF F7 56 FF 20 2D 06 D0 A5 F1 30 05 06 F8 01 5B 01 F1 01 01 F4 E7 4F F0 0A 0A 4F F0 01 02
```

Stellaris ICDI   t1: 0.00000000 sec   L:53 C:5

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
LDRB
Registers
main.s MYPARCEL.s FirstArea.s SecondArea.s ThirdArea.s NUMIN.s InChar.s FourthArea.s
Settings Clear About Close
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE COVTOFILE DEFINE DIR Display Enter
Project Registers
Call Stack + Locals Memory 1
CAP NUM SCRL OVR R/W
11:06
16.11.2020

85 --- no village is suitable -- 85



C:\Users\EfePC\Desktop\LAB\LW1\PARCEL\PARCEL.uvprojx - µVision [Non-Commercial Use License]

```
Register        Value
Core
  R0            0x00000055
  R1            0x00000055
  R2            0x00000054
  R3            0x00000000
  R4            0x00000055
  R5            0x20000405
  R6            0x20000800
  R7            0x20000800
  R8            0x00000000
  R9            0x00000000
  R10           0x0000000a
  R11           0x00000000
  R12           0x00000000
  R13 (SP)      0x20000400
  R14 (LR)      0x000004a3
  R15 (PC)      0x000004a2
  xPSR          0x61000000
Banked
System
Internal
  Mode          Thread
  Privilege     Privileged
  Stack         MSP
  States        0
  Sec           0.00000000
FPU
```

Disassembly

```
0x0000049E F7FFFEF1  BL.W          OutStr (0x00000284)
    56:                             NOP
0x000004A2 BF00      NOP
    57:                             NOP
0x000004A4 BF00      NOP
    58: LOOP2          B    LOOP2
```

main.s

```
                CMP     R6,R7           ; IF THERE IS ONLY 1 MINIMUM, GO TO EXIT
                BEQ     FINISH
LOOP            LDR     R0,[R7,#4]!     ;R7'NIN SON DEGERINE YANI SON MINIMUMA GELENE KADAR COMPARE EDIP EN KUCUGUNU YANI GL
                CMP     R0,R1
                CPYLS   R1,R0           ;R1 GLOBAL MINIMUM OLUYOR
                CMP     R7,R6
                BEQ     FINISH
                B       LOOP

FINISH          LDR     R5,=MSG2
                BL      OutStr          ; Copy message



                LDR     R5,=MSG
                CPY     R4,R1           ;GLOBAL MINIMUM OLAN R1'I R4'E AKTARIYORUM, CONVRT R4 ISTIYOR
                BL      CONVRT
                LDR     R5,=MSG         ;GLOBAL MINIMUM'UN ASCII'YE CEVIRILIP SAKLANACAGI ADRES MSG
                BL      OutStr          ;GLOBAL MINIMUM BASILIYOR
                NOP
                NOP
LOOP2           B       LOOP2

                NOP
                NOP







                ALIGN
                END
```

Termite 3.4 (by CompuPhase)

COM3 9600 bps, 8N1, no handshake

```
ENTER A INPUT:
85 GLOBAL MINIMUM:
85
```

Command

```
*** error 35: undefined line number
BS \\PARCEL\main.s\53
BS \\PARCEL\main.s\29
```

Memory 1

Address: 0X20000800

```
0x20000800: 55 00 00 00 12 00 00 00 19 00 00 00 2D 00 00 00 3F 00 00 00 3A 00 00 00 48 00 00 00 19 00 00 00 2D 00
0x20000822: 00 00 34 00 00 00 B6 00 00 00 7D 02 00 00 E1 02 00 00 45 03 00 00 A9 03 00 00 0D 04 00 00 71 04 00 00
0x20000844: D5 04 00 00 52 00 00 00 19 00 00 00 2D 00 00 00 34 00 00 00 B6 00 00 00 1A 01 00 00 7E 01 00 00 39 05
0x20000866: 00 00 9D 05 00 00 01 06 00 00 65 06 00 00 C9 06 00 00 2D 07 00 00 91 07 00 00 52 00 00 00 19 00 00 00
0x20000888: 2D 00 00 00 34 00 00 00 B6 00 00 00 1A 01 00 00 7E 01 00 00 E2 01 00 00 46 02 00 00 F5 07 00 00 59 08
```

Stellaris ICDI   t1: 0.00000000 sec   L:56 C:1

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
LDRB
Registers
main.s MYPARCEL.s FirstArea.s SecondArea.s ThirdArea.s NUMIN.s InChar.s FourthArea.s OutStr.s
Settings Clear About Close
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE COVTOFILE DEFINE DIR Display Enter
Project Registers
Call Stack + Locals Memory 1
CAP NUM SCRL OVR R/W
11:28
16.11.2020

```
        AREA    main,   READONLY,   CODE
        THUMB
        EXTERN  CONVRT
        EXTERN  OutStr
        EXPORT  __main

NUM     EQU 0X20000500

__main

        MOV32   R4,#0x0     ; DENENECEK SAYI
        LDR     R5,=NUM
        BL      CONVRT
        LDR     R5,=NUM
        BL      OutStr
        NOP
        NOP
        NOP
loop    B       loop

        END

```

```
FIRST   EQU 0X20000480

    AREA    subroutine, READONLY,   CODE
    THUMB
    EXPORT  CONVRT

;   BU KOD R4'TE VERILEN DEGERI ASCII'YE, BASILABILECEK HALE CEVIRIYOR
;   R4 IS MY NUMBER TO BE CONVERTED TO ASCII
;   R5 HAS THE ADDRESS OF THE MESSAGE
;   IF YOU WANT TO DISPLAY R5, AFTER CALLING THIS FUNCTION, REASSIGN R5 TO THE BEGINNING OF THE MESSAGE

CONVRT
    PUSH    {R0-R4}
    MOV     R0,#0XA
    LDR     R3,=FIRST

LOOP1                   ; BASAMAKLARA AYIR

    UDIV    R1,R4,R0
    MUL     R1,R1,R0
    SUB     R1,R4,R1
    STRB    R1,[R3],#1
    UDIV    R4,R4,R0
    CMP     R4,#0
    BNE     LOOP1

    MOV     R0,#0
    MOV     R1,#0
    LDR     R1,=FIRST

LOOP2                   ;   TRANSLATION AND STORING

    SUB     R3,R3,#1
    LDR     R0,[R3]
    ADD     R0,R0,#48   ; TRANSLATE TO ASCII
    STRB    R0,[R5],#1
    CMP     R3,R1
    BNE     LOOP2


    MOV     R0,#0X0A    ; NEW LINE
    STRB    R0,[R5]
    ADD     R5,R5,#1
    MOV     R0,#0X0D
    STRB    R0,[R5]
    ADD     R5,R5,#1
    MOV     R0,#0X04
    STRB    R0,[R5]
    POP     {R0-R4}
    BX      LR
    ALIGN
    END

```

```
        AREA    main,   READONLY,   CODE
        THUMB
        EXTERN  CONVRT
        EXTERN  OutStr
        EXTERN  InChar
        EXPORT  __main

NUM     EQU     0X20000100
DEC     EQU     0X20000200


__main
        LDR     R0,=NUM
        MOV     R1,#1234        ; NUMBER TO BE PRINTED
        STR     R1,[R0]
get     BL      InChar
        CMP     R5,#0X20        ;SPACEBAR GIRDIYSE PROGRAMDAN CIK
        BEQ     LOOP

        LDR     R0,=NUM         ;0X20000200 ADRESINI ATA
        LDR     R4,[R0]         ;O ADRESTEKI SAYIYI R4'E ATA
        LDR     R5,=DEC         ;R4'TEKI SAYIYI CONVERT EDIP ATAYACAGIMIZ ADRESI R5'E ATA
        BL      CONVRT          ;CONVERT ET
        LDR     R5,=DEC         ;CONVERT EDILMIS ADERSIN BASINI ATA
        BL      OutStr          ;OUTPUT ET
        B       get

LOOP    B       LOOP
        END
        AREA    main,   READONLY,   CODE
        THUMB
        EXTERN  CONVRT
        EXTERN  OutStr
        EXTERN  InChar
        EXTERN  UPBND
        EXPORT  __main

;   R0 <- N
;   R1 <- DOWN
;   R2 <- UP
;   R4 <- GUESS
NUM     EQU 0X20000500

__main
; 2 TANE ASCII DEC INPUT ALDIGIM YER VE ONLARI ASCII'DEN KURTARIYORUM, R0 INPUT OLUYOR
; INPUT XX SEKLINDE GELECEK VE EGER 0-9 ISE 0X SEKLINDE GIRILMEK ZORUNDA
        MOV     R0,#0
        MOV     R1,#10
        BL      InChar
        SUB     R5,#48
        MUL     R5,R1
        ADD     R0,R5
        BL      InChar
        SUB     R5,#48
        ADD     R0,R5

        CPY     R3,R0   ;R3 KADAR UST ALCAM R2=R0
        MOV     R2,#1
        MOV     R1,#2
EXP     MUL     R2,R1
        SUBS    R3,#1
        BNE     EXP     ;R2 BENIM UP DEGERIM OLDU

        MOV     R5,#2
        MOV     R1,#0   ;R1 BENIM LOW DEGERIM OLDU
        ADD     R4,R1,R2
        UDIV    R4,R5   ; R4 BENIM TAHMININ OLDU
        NOP
        NOP
        NOP


;   SIMDI R4'YI EKRANA YAZICAM, BUNU YAPMAK ICIN CONVRT KULLANMAM LAZIM
LOOP    LDR     R5,=NUM
        BL      CONVRT
        LDR     R5,=NUM
        BL      OutStr
;   USER C U YA DA D INPUTUNU GIRECEK, R5 OLACAK BU
        BL      InChar
;   R5 = C ISE PROGRAM SONLANACAK
        CMP     R5,#67
        BEQ     EXIT
;   DEGIL ISE UPBND CAGIRILACAK, R5'E GORE D YA DA U ISLEMI YAPILACAK, LOOP'A DONULECEK
        CMP     R1,R2   ; IF LOWER=UPPER AND INPUT IS NOT C, GO TO BEGINNING, CHANGE NOTHING
        BEQ     LOOP
        BL      UPBND   ; BUNDAN SONRA CMP'YE GERI ATLIYOR LOOP'A ATLAMASI GEREKIRKEN
        B       LOOP

EXIT    NOP
        NOP
        NOP
        ALIGN
        END
        AREA    subroutine, READONLY,   CODE
        THUMB
        EXPORT  UPBND


UPBND
        CMP     R5,#68      ; D MI DIYE KONTROL ET
        SUBEQ   R2,R4,#1    ; D ISE UPPER=GUESS-1
        ADDNE   R1,R4,#1    ; U ISE LOWER=GUESS+1
        ADD     R4,R1,R2    ; YENI TAHMIN = (UPPER + LOWER ) / 2
        MOV     R6,#2
        UDIV    R4,R6
        BX      LR

        ALIGN
        END

        AREA    main,   READONLY,   CODE
        THUMB
;       EXTERN  OutStr
        EXTERN  NUMIN
        EXTERN  MYPARCEL
        EXTERN  CONVRT
        EXTERN  OutStr
        EXPORT  __main

MIN     EQU     0X20000800
MSG     EQU     0X20000400
    ;       R0 N OLACAK
    ;       R7 MINIMUMLARIN SAKLANDIGI ADRES OLACAK
MSG1        DCB         "ENTER A INPUT: "
            DCB         0x0D        ; Carriage return is like new line
            DCB         0x04        ; it is like EOF or \0

MSG2        DCB         "GLOBAL MINIMUM: "
            DCB         0x0D        ; Carriage return is like new line
            DCB         0x04        ; it is like EOF or \0

__main
                LDR     R5,=MSG1        ; Copy message
                BL      OutStr          ; Copy message

                BL      NUMIN           ; BU SUBROUTINE INPUT ALMAK ICIN KULLANILIYOR

                LDR     R7,=MIN         ;R7'NIN GOSTERDIGI ADRES VE SONRASINDA TUM MINIMUM DEGERLER SAKLANACAK
                BL      MYPARCEL        ;BURADA RECURSION BASLIYOR
                NOP
                NOP

                SUB     R7,#4
                CPY     R6,R7           ;R7'NIN SON DEGERI
                LDR     R7,=MIN
                LDR     R1,[R7]
                CMP     R6,R7           ; IF THERE IS ONLY 1 MINIMUM, GO TO EXIT
                BEQ     FINISH
LOOP            LDR     R0,[R7,#4]!     ;R7'NIN SON DEGERINE YANI SON MINIMUMA GELENE KADAR COMPARE EDIP EN KUCUGUNU YANI GLOBAL MINIMUMU BULUYORUM
                CMP     R0,R1
                CPYLS   R1,R0           ;R1 GLOBAL MINIMUM OLUYOR
                CMP     R7,R6
                BEQ     FINISH
                B       LOOP

FINISH          LDR     R5,=MSG2
                BL      OutStr          ; Copy message



                LDR     R5,=MSG
                CPY     R4,R1           ;GLOBAL MINIMUM OLAN R1'I R4'E AKTARIYORUM, CONVRT R4 ISTIYOR
                BL      CONVRT
                LDR     R5,=MSG         ;GLOBAL MINIMUM'UN ASCII'YE CEVIRILIP SAKLANACAGI ADRES MSG
                BL      OutStr          ;GLOBAL MINIMUM BASILIYOR
                NOP
                NOP
LOOP2           B       LOOP2

                NOP
                NOP








                ALIGN
                END
```

```
NUM         EQU     0X20000400

            AREA    subroutine, READONLY,   CODE
            THUMB
            EXTERN  InChar
            EXPORT  NUMIN


NUMIN
            ;R0 N OLACAK
            LDR     R6,=NUM ; NUM ILE GOSTERILEN ADRESTE TUTULACAK KARAKTERLER
            MOV     R1,#0   ; NUMBER OF DIGITS ENTERED
            MOV     R0,#0   ; N
            PUSH    {LR}

get         BL      InChar  ; GET INPUT UNTIL SPACEBAR IS LOGGED
            CMP     R5,#0x20
            BEQ     done
            SUB     R5,#48  ; ASCII'DEN KURTARIYORUM
            STRB    R5,[R6],#1  ;NUM ILE GOSTERILEN YERE BYTE BYTE YAZIYORUM
            ADD     R1,#1
            B       get

done        MOV     R10,#10
            MOV     R2,#1
LOOP2       SUB     R6,#1       ; TUM DIGITLERI 10'UN KATLARI ILE CARPIP TOPLUYORUM KI N SAYISINI BULAYIM
            LDRB    R7,[R6]
            MUL     R5,R7,R2
            ADD     R0,R5
            MUL     R2,R10
            SUBS    R1,#1
            BNE     LOOP2   ; N IS OBTAINED IN R0
            POP     {LR}
            BX      LR
            ALIGN
            END
            AREA subroutine,    READONLY,   CODE
            THUMB
            EXTERN  FirstArea
            EXTERN  SecondArea
            EXTERN  ThirdArea
            EXTERN  FourthArea
            EXPORT  MYPARCEL


MYPARCEL
            PUSH    {R0,LR}             ; ADRESI VE R0 DEGERINI KAYBETMEMEK ICIN STACK'E ATIYORUM
            BL      FirstArea           ; SIRASIYLA BUTUN KOYLERE UGRAYIP TUM MINIMUMLARI RECURSION ILE BULUYORUM
            BL      SecondArea
            BL      ThirdArea
            BL      FourthArea
            NOP
            NOP
            NOP
            STR     R0,[R7],#4          ; EN SONDA ULASILAN MINIMUM DEGERI SAKLANIYOR
            POP     {R0,LR}             ; BI ONCE GIDECEGIM ADRES VE R0 DEGERIM POPLANIYOR
            BX      LR
            ALIGN
            END



            AREA subroutine,    READONLY,   CODE
            THUMB
            EXTERN  MYPARCEL
            EXPORT  FirstArea

FirstArea
            PUSH    {R0,LR}
            CMP     R0,#99          ; 100'DEN BUYUK MU
            BLS     JUMP
            SUB     R0,#100
            BL      MYPARCEL
JUMP        POP     {R0,LR}
            BX      LR
            END
            AREA subroutine,    READONLY,   CODE
            THUMB
            EXTERN  MYPARCEL
            EXPORT  SecondArea

SecondArea

            PUSH    {R0,LR}
            MOV     R1,#7           ;7'YE BOLUNEBILIYOR MU
            UDIV    R2,R0,R1
            MUL     R2,R2,R1
            CMP     R0,R2
            BNE     JUMP            ; BOLUNEMIYORSA CIK

            UDIV    R2,R2,R1        ; BOLUNEBILIYORSA R0'DAN  5M CIKAR RECURSION YAP
            MOV     R1,#5
            MUL     R2,R2,R1
            SUB     R0,R2
            BL      MYPARCEL
JUMP        POP     {R0,LR}
            BX      LR
            END
            AREA subroutine,    READONLY,   CODE
            THUMB
            EXTERN  MYPARCEL
            EXPORT  ThirdArea

ThirdArea

            PUSH    {R0,LR}
            MOV     R1,#530         ;530'DAN BUYUK MU
            CMP     R0,R1
            BHI     JUMP            ;DEGILSE CIK
            MOV     R1,#4           ;4'E BOLUNUR MU
            UDIV    R2,R0,R1
            MUL     R2,R2,R1
            CMP     R0,R2
            BNE     JUMP            ;BOLUNMUYORSA CIK
            MOV     R1,#10
            MOV     R4,#0
            PUSH    {R0}
LOOP        UDIV    R2,R0,R1        ; BASAMAKLARI TOPLAMI R4'TE SAKLANIYOR
            MUL     R2,R2,R1
            SUB     R2,R0,R2
            ADD     R4,R2
            UDIV    R0,R0,R1
            CMP     R0,#0
            BNE     LOOP

            POP     {R0}
            SUB     R0,R4
            BL      MYPARCEL
JUMP        POP     {R0,LR}
            BX      LR
            END
            AREA subroutine,    READONLY,   CODE
            THUMB
            EXTERN  MYPARCEL
            EXPORT  FourthArea

FourthArea

            PUSH    {R0,LR}
            CMP     R0,#99      ;100'DEN BUYUK MU
            BHI     JUMP

            CMP     R0,#9       ;10'DAN KUCUK MU
            BLS     JUMP

            MOV     R1,#3           ;3'E BOLUNUR MU
            UDIV    R2,R0,R1
            MUL     R2,R2,R1
            CMP     R0,R2
            BNE     JUMP

            MOV     R1,#10
            MOV     R4,#0
            PUSH    {R0}
            UDIV    R2,R0,R1        ; BASAMAKLARI CARPIMI R1'DE SAKLANIYOR
            MUL     R2,R2,R1
            SUB     R2,R0,R2
            UDIV    R0,R0,R1
            MUL     R1,R0,R2
            POP     {R0}
            SUB     R0,R1
            BL      MYPARCEL
JUMP        POP     {R0,LR}
            BX      LR
            END
```