Instituto Politécnico Nacional

Escuela Superior de Cómputo

Raíz Cuadrada

TAREA 2

Materia:

Introducción a los microcontroladores

Grupo:

3CM16

Profesor:

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Integrantes:

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Cortes Ramírez Roberto Carlos

Dominguez Acosta José Praxedes

Fecha:

Martes, 5 de octubre de 2021

Descripción del problema

Escribir un programa que obtenga la raíz cuadrada (la parte entera) del número presente en el puerto B, el resultado se deberá mostrar en el puerto A. El rango de los datos de entrada será de $00 al $FF (0 al 255).

Escribe un programa para obtener la raiz cuadrada (solo la parte entera) del número presente en el puerto B, el resultado mostrarlo en el puerto A.

entrada	salida
0	0
1	1
2	1
3	1
4	2
5	2
6	2
7	2
8	2
9	3
.	
.	
255	15

16

36

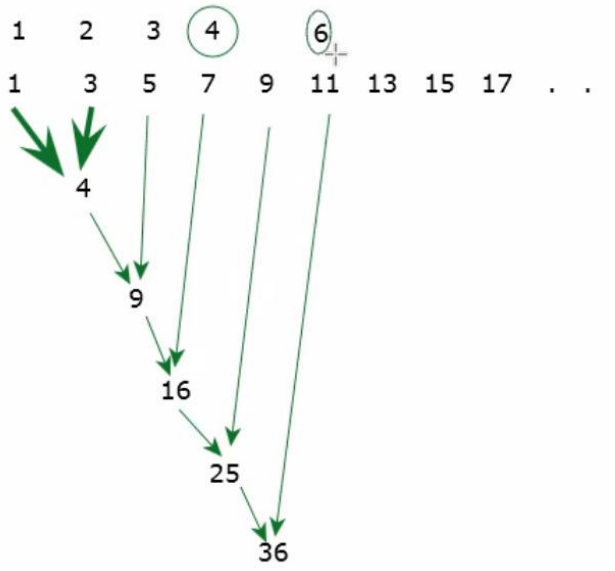
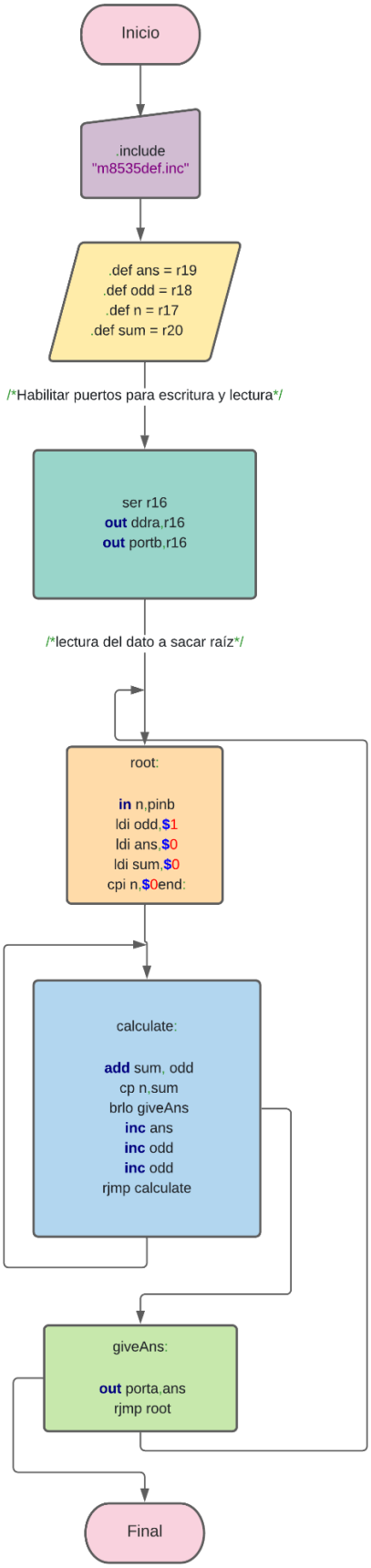


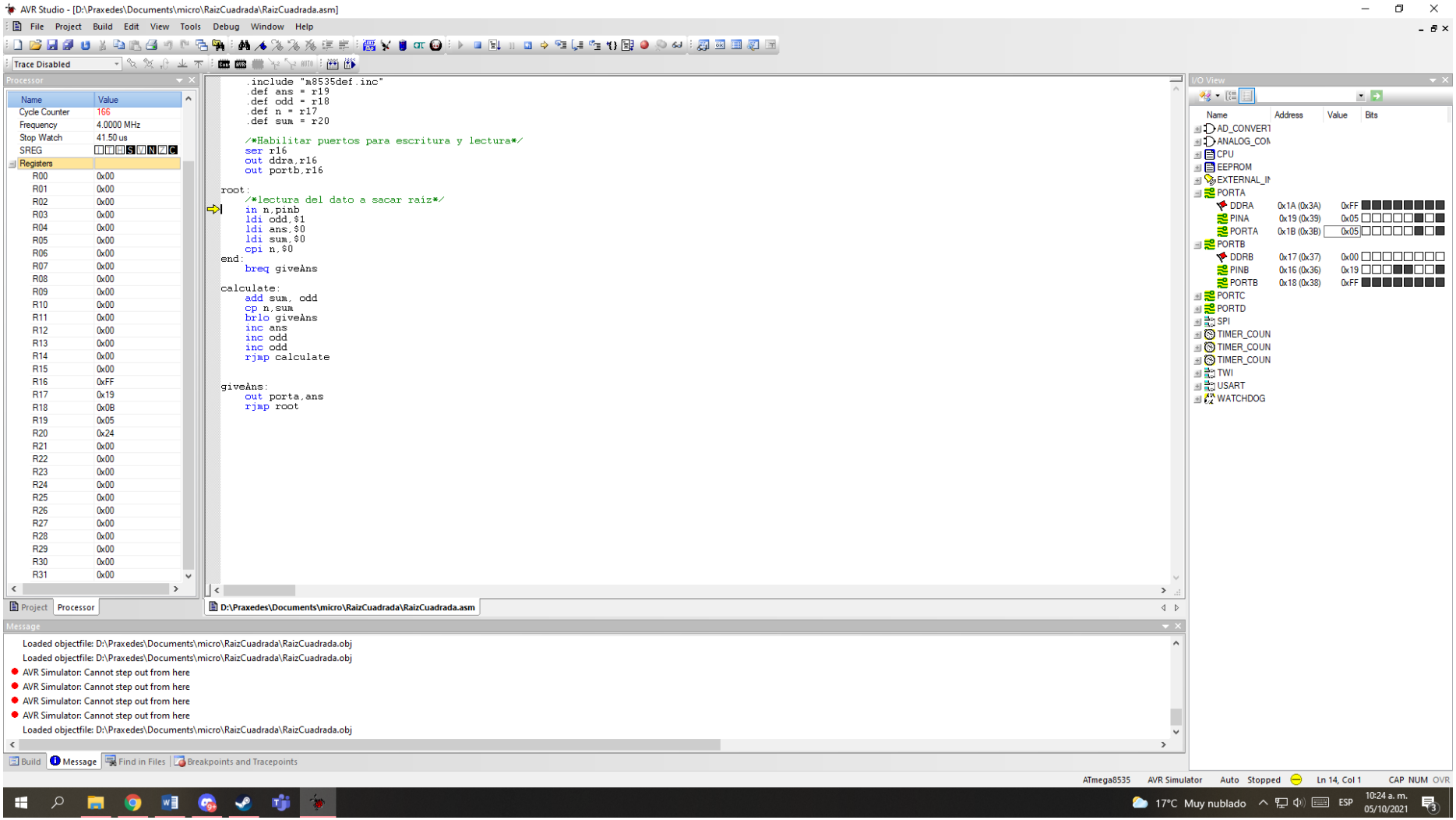
Diagrama de flujo del programa

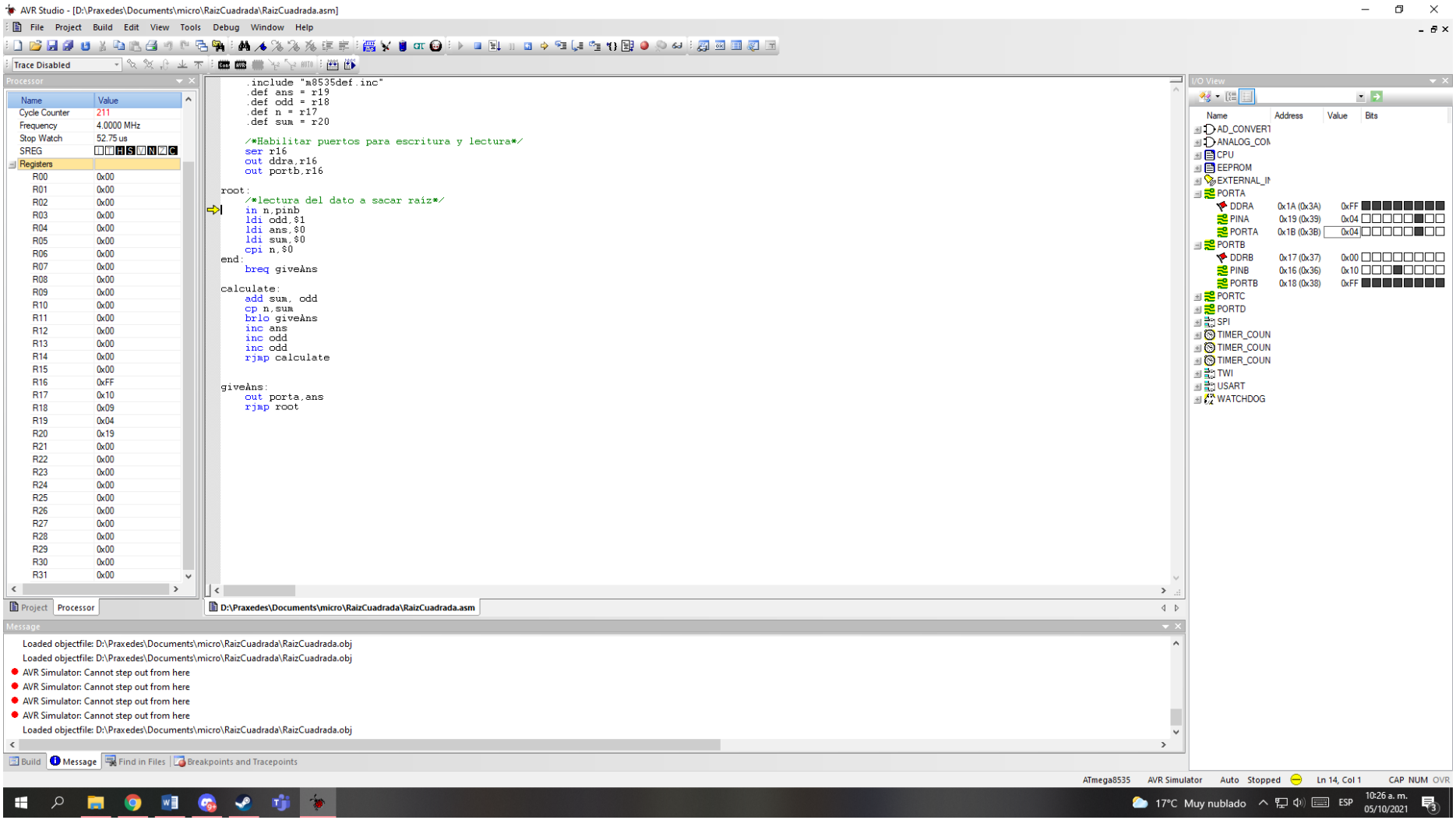


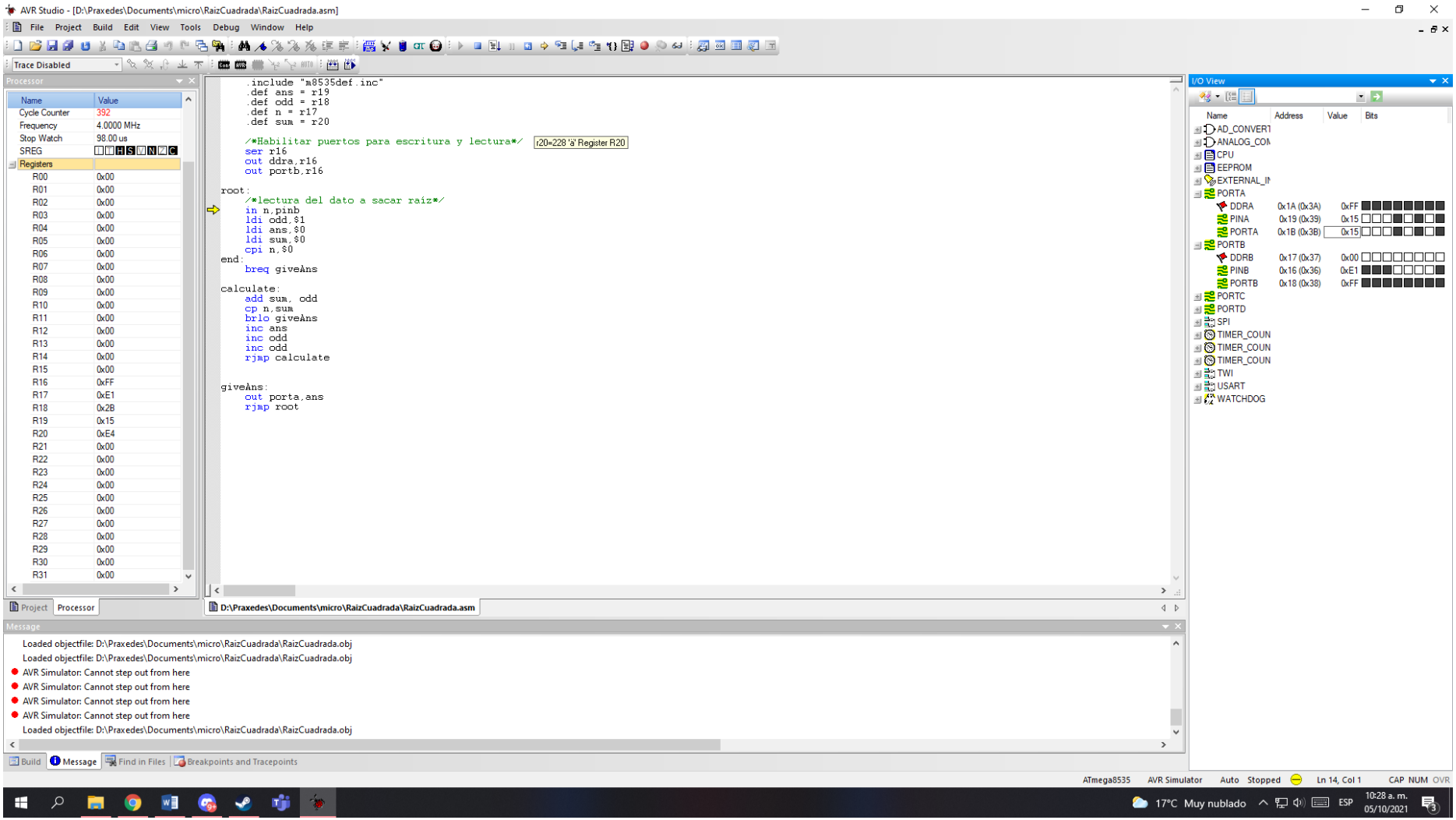
Código del programa

```
1.      .include "m8535def.inc"
2.      .def ans = r19
3.      .def odd = r18
4.      .def n = r17
5.      .def sum = r20
6.
7.      /*Habilitar puertos para escritura y lectura*/
8.      ser r16
9.      out ddra,r16
10.          out portb,r16
11.
12.     root:
13.          /*lectura del dato a sacar raíz*/
14.          in n,pinb
15.          ldi odd,$1
16.          ldi ans,$0
17.          ldi sum,$0
18.          cpi n,$0
19.     end:
20.          breq giveAns
21.
22.     calculate:
23.          add sum, odd
24.          cp n,sum
25.          brlo giveAns
26.          inc ans
27.          inc odd
28.          inc odd
29.          rjmp calculate
30.
31.
32.     giveAns:
33.          out porta,ans
34.          rjmp root
```

Simulación en AVR Studio 4




AVR Studio - [D:\Praxedes\Documents\micro\RaizCuadrada\RaizCuadrada.asm]
File Project Build Edit View Tools Debug Window Help
Trace Disabled
Processor
Name Value
Cycle Counter 211
Frequency 4.0000 MHz
Stop Watch 52.75 us
SREG I T H S V N Z C
Registers
R00 0x00
R01 0x00
R02 0x00
R03 0x00
R04 0x00
R05 0x00
R06 0x00
R07 0x00
R08 0x00
R09 0x00
R10 0x00
R11 0x00
R12 0x00
R13 0x00
R14 0x00
R15 0x00
R16 0xFF
R17 0x10
R18 0x09
R19 0x04
R20 0x19
R21 0x00
R22 0x00
R23 0x00
R24 0x00
R25 0x00
R26 0x00
R27 0x00
R28 0x00
R29 0x00
R30 0x00
R31 0x00
Project Processor
.include "m8535def.inc"
.def ans = r19
.def odd = r18
.def n = r17
.def sum = r20
/*Habilitar puertos para escritura y lectura*/
ser r16
out ddra,r16
out portb,r16
root:
/*lectura del dato a sacar raíz*/
in n,pinb
ldi odd,$1
ldi ans,$0
ldi sum,$0
cpi n,$0
end:
breq giveAns
calculate:
add sum, odd
cp n,sum
brlo giveAns
inc ans
inc odd
inc odd
rjmp calculate
giveAns:
out porta,ans
rjmp root
D:\Praxedes\Documents\micro\RaizCuadrada\RaizCuadrada.asm
I/O View
Name Address Value Bits
AD_CONVERT
ANALOG_COM
CPU
EEPROM
EXTERNAL_IN
PORTA
DDRA 0x1A (0x3A) 0xFF
PINA 0x19 (0x39) 0x04
PORTA 0x1B (0x3B) 0x04
PORTB
DDRB 0x17 (0x37) 0x00
PINB 0x16 (0x36) 0x10
PORTB 0x18 (0x38) 0xFF
PORTC
PORTD
SPI
TIMER_COUN
TIMER_COUN
TIMER_COUN
TWI
USART
WATCHDOG
Message
Loaded objectfile: D:\Praxedes\Documents\micro\RaizCuadrada\RaizCuadrada.obj
Loaded objectfile: D:\Praxedes\Documents\micro\RaizCuadrada\RaizCuadrada.obj
AVR Simulator: Cannot step out from here
AVR Simulator: Cannot step out from here
AVR Simulator: Cannot step out from here
AVR Simulator: Cannot step out from here
Loaded objectfile: D:\Praxedes\Documents\micro\RaizCuadrada\RaizCuadrada.obj
Build Message Find in Files Breakpoints and Tracepoints
ATmega8535 AVR Simulator Auto Stopped Ln 14, Col 1 CAP NUM OVR
17°C Muy nublado ESP 10:26 a. m. 05/10/2021


AVR Studio - [D:\Praxedes\Documents\micro\RaizCuadrada\RaizCuadrada.asm]
File Project Build Edit View Tools Debug Window Help
Trace Disabled
Processor
Name Value
Cycle Counter 392
Frequency 4.0000 MHz
Stop Watch 98.00 us
SREG I T H S V N Z C
Registers
R00 0x00
R01 0x00
R02 0x00
R03 0x00
R04 0x00
R05 0x00
R06 0x00
R07 0x00
R08 0x00
R09 0x00
R10 0x00
R11 0x00
R12 0x00
R13 0x00
R14 0x00
R15 0x00
R16 0xFF
R17 0xE1
R18 0x2B
R19 0x15
R20 0xE4
R21 0x00
R22 0x00
R23 0x00
R24 0x00
R25 0x00
R26 0x00
R27 0x00
R28 0x00
R29 0x00
R30 0x00
R31 0x00
Project Processor
.include "m8535def.inc"
.def ans = r19
.def odd = r18
.def n = r17
.def sum = r20
/*Habilitar puertos para escritura y lectura*/
r20=228 'ä' Register R20
ser r16
out ddra,r16
out portb,r16
root:
/*lectura del dato a sacar raíz*/
in n,pinb
ldi odd,$1
ldi ans,$0
ldi sum,$0
cpi n,$0
end:
breq giveAns
calculate:
add sum, odd
cp n,sum
brlo giveAns
inc ans
inc odd
inc odd
rjmp calculate
giveAns:
out porta,ans
rjmp root
D:\Praxedes\Documents\micro\RaizCuadrada\RaizCuadrada.asm
I/O View
Name Address Value Bits
AD_CONVERT
ANALOG_COM
CPU
EEPROM
EXTERNAL_IN
PORTA
DDRA 0x1A (0x3A) 0xFF
PINA 0x19 (0x39) 0x15
PORTA 0x1B (0x3B) 0x15
PORTB
DDRB 0x17 (0x37) 0x00
PINB 0x16 (0x36) 0xE1
PORTB 0x18 (0x38) 0xFF
PORTC
PORTD
SPI
TIMER_COUN
TIMER_COUN
TIMER_COUN
TWI
USART
WATCHDOG
Message
Loaded objectfile: D:\Praxedes\Documents\micro\RaizCuadrada\RaizCuadrada.obj
Loaded objectfile: D:\Praxedes\Documents\micro\RaizCuadrada\RaizCuadrada.obj
AVR Simulator: Cannot step out from here
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AVR Simulator: Cannot step out from here
Loaded objectfile: D:\Praxedes\Documents\micro\RaizCuadrada\RaizCuadrada.obj
Build Message Find in Files Breakpoints and Tracepoints
ATmega8535 AVR Simulator Auto Stopped Ln 14, Col 1 CAP NUM OVR
17°C Muy nublado ESP 10:28 a. m. 05/10/2021