

## Div16\_8

Write a function named Div16\_8 to divide an unsigned 16 bit number by an unsigned 8 bit number. Test your function by writing a program named Div8\_test to test the subroutine Div16\_8 by dividing the 16-bit-number: 0xAAAA by the 8-bit-number 0x55.

The screenshot shows an AVR assembler IDE with the following components:

- Registers Window:** Shows the state of AVR registers. R19 contains 0x55 and R21 contains 0x02. Other registers are mostly 0x00.
- Code Window:** Contains assembly code for a test program and a subroutine.
 

```

      ldi r16,0xAA
      mov NH,r16
      mov NL,r16
      ldi Denominator, 0x55
      //Call the 16 bit by 8 bit division
      rcall Div16_8
      ret

      ;*****
      * subroutine divides unside 16bit by 8bit
      * Quotient = Numerator/Denominator *
      * r22:r21 = r25:r24 / r19 *
      ;*****/
      Div16_8:
      clr r22
      clr r21

      // loop L1 stops when the numerator - denominator = less than the demoninator
      L1:
      //QL is going to increment by 1, everytime L1 loops
      inc QL //r22

      //When QL reaches 255 or 0xFF and then goes back to 0, QH is going to increment by 1
      cpi r21,0
      brne No_Inc
      inc QH //r22

      No_Inc:
      sub r24,Denominator // r19
      sbc r25,r2

      brcc L1

      //Since r21 is incremented by 1 when the loop began, after the loop r21 is decremented
      dec QL //r21

      //Notice L1 is going to branch off when the numerator is no lnger divisiable by the denominator
      //Which means L1 is branching off when r24-denominator results in a negative value.
      //Therefore, the denominator is going to be added to the r24 after the loop.
      add r24,Denominator //r24,r19
      adc r25,r2

      ret
      
```
- Watch Window:** Shows the values of registers NH, NL, Denominator, QH, and QL.
 

Name	Value	Type	Location
NH	0xAA	Register	R25
NL	0xAA	Register	R24
Denominator	0x55	Register	R19
QH	0x02	Register	R22
QL	0x02	Register	R21

0XAAAA/0X55=0X0202