# **OBJECTIVES:**

* To write a program to perform calculations.

# **MATERIAL:**

* Atmel Studio

# **WEB SITES:**

* [www.microchip.com](http://www.microchip.com/) for Atmel Studio Software

# **ACTIVITY 1**

Write a program that calculates (PORTC + 4) \* PORTD and sends out the result through PORTB. Consider all the values are unsigned.

# **ACTIVITY 2**

Write a program to calculate the result of (PORTB + PORTD)/2 and send out the result through PORTB. Consider all the values are unsigned. (Note: To divide by two, you can use shift right operation)

# **ACTIVITY 3**

1. Find the value in R0 and R1 after the following code. What are the values kept in R0 and R1?

LDI R16, 10

LDI R17, 20

LDI R18, 30

MUL R16, R17

ADD R0, R18

1. Find the value in R0 and R1 after the following code.What are the values kept in R0 and R1?

LDI R19, 19

SUBI R19, 10

LDI R30, 30

MUL R30, R19

# **ACTIVITY 4**

Write a program to add 10 bytes of data and store the result in registers R30 and R31. The bytes are stored in the **Program memory** starting at $200. The data would look as follows:

MYDATA: .DB 92,34,84,129,... ;pick your own data.

**Note** you must first bring the data from Program memory into the registers, then add them together. Use a simulator and single-step to examine the data.

# **ACTIVITY 5**

Write a program to add 10 bytes of Binary-Coded Decimal (BCD) data and store the result in R30 and R31. The bytes are stored in **Program memory** starting at $300. The data would look as follows:

MYDATA: .DB $92,$34,$84,$29,... ;pick your own data.

**Note** you must first bring the data from Program memory into the registers, then add them together. Use a simulator and single-step to examine the data.

# **ACTIVITY 6**

Write a program to add two BCD numbers and store the result in **RAM** location $100 - $104. The two multibyte items are stored in the program memory starting at $120 as following data.

.ORG $120

DATA\_1: .DB $54,$76,$65,$98 ;number 0x98657654

DATA\_2: .DB $93,$56,$77,$38 ;number 0x38775693