# **OBJECTIVES:**

* To code a program to transfer data from program memory into RAM locations.
* To code a program to transfer data from RAM locations to other RAM locations.
* To experiment with a look-up table.

# **MATERIAL:**

* Atmel Studio

# **WEB SITES:**

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

# **ACTIVITY 1**

Write a program to transfer a string of data from **program memory** starting at address $200 to RAM locations starting at $140. Using the simulator, single-step through the program and examine the data transfer and registers.

# **ACTIVITY 2**

Add the subroutine to the program in Activity 1. After data has been transferred from program memory into RAM, the subroutine function should copy the data from **RAM** locations starting at $140 to **RAM** locations starting at $160. Use single-step through the subroutine and examine the operations.

# **ACTIVITY 3**

1. Write a program to calculate y where y = x2 + 2x + 9. Where x is the number between 0 and 9 and the look-up table for x2 is located at the address $200 of **program memory**. Register R20 keeps the value of x, and at the end of the program R21 should contain the value of y. Use the simulator to change the x value and single-step through the program, examining the changes.
2. Explain the difference between the following two instructions:
3. LPM R16, Z
4. LD R16, Z
5. Circle the invalid instructions.
6. LDS R20, 60
7. LD R30, Z
8. LD R25, Z+
9. LPM R25, Z+4
10. Explain the difference between the following two instructions:
11. LDS R20, $40
12. LDI R20, $40