EE 2004
Week 3 Tutorial

1. 16-bit addition using MPLAB

1.1. Write down your answer for the following 16-bit hexadecimal addition: 3432+57DF.

1.2. Open MPLAB IDE.

1.3. Click “Project”, “New…” and type in the project name “TutorialExercise1” and specify the directory “C:\Code\TutorialExercise1”.

1.4. Click “View”, “Project”.

1.5. Right click “Source Files” in the Project Window and click “Add Files”. Select “TutorialExercise1.asm”, which can be downloaded in Canvas.

1.6. Click “Debugger”, select “Select Tools” and choose “MPLAB SIM”.

1.7. Press F10 and select “Absolute”.

1.8. “BUILD SUCCEEDED” should appear at Output window. Should “BUILD FAILED” appear instead, check for the error messages, fix the errors and Step 7.

1.9. Click “View”, “Watch”.

1.10. Inside the Watch window, perform the following two operations:
(a) In the Symbol Name column of the Watch window, type WREG and PCLAT.
(b) In the Address column, type 005 and 006.

1.11. Click “View”, “Program Memory”. Observe how instructions are organized in the program memory.

1.12. Replace the line “ORG 0x0000” by “ORG 0x0020” and build the program again by following Steps 7-8. Observe the difference in the Program Memory window as compared to Step 11. What is the function of the directive “ORG 0x0020”?

1.13. Press F7 to go through the program line by line and observe the Watch window. Pay attention to the changes in the Watch window.

1.14. Step pass the “addwf 0x05, F, A” and look at the status bar at the bottom of the window. Do you see a line “n ov z DC C” at the bottom of the MPLAB program window? What does it mean?

1.15. Step through the whole program.

1.16. Obtain the sum of 3432 and 57DF by combining the contents in memory location 005 and 006. Does your result match the result you calculated in Step 1?

1.17. Change the line “addwfc 0x06, F, A” to “addwfc 0x06, W, A”. Repeat Steps 7-8. Repeat Steps 15-16. Compare the results with those you got earlier.

1.18. Change the line to “addwf 0x06, F, A”. Repeat Steps 7-8, 15-16. Compare the results with those you got earlier.

2. Data memory architecture: access bank and bank select register (BSR)

2.1. Generate a MPLAB IDE project as in Tutorial MPLAB for Week 3. Right click “Source Files” in the Project Window and click “Add Files”. Select “BSRAccessBank.asm”

2.2. Click “Debugger”, select “Select Tools” and choose “MPLAB SIM”.

2.3. Press F10 and select “Absolute”.

2.4. “BUILD SUCCEEDED” should appear at Output window. Should “BUILD FAILED” appear instead, check for the error messages, fix any errors found and repeat 2.3.

2.5. Click “View”, “Watch”.

2.6. In the Symbol Name column of the Watch window, type WREG.

2.7. In the Address column of the Watch window, type 0x020 and 0x220.

2.8. Press F7 to go through the program line by line and observe the Watch window. Pay attention to the changes in the Watch window.

2.9. Identify the 12-bit address of the file register that stores the sum of the addition operation.

2.10. Comment out the “goto UseAccessBank” by putting a semi-colon in front of the line.

2.11. Uncomment the “goto UseBSR” line by removing the semi-colon.

2.12. Press F10 to rebuild the program.

2.13. Press F7 to step through the program.

2.14. Identify the 12-bit address of the file register that stores the sum of the addition operation. Compare your observation with the result in 2.9.