**Virginia Tech ■ ECE 5484**

**Tables for Depicting MARIE Program Execution**

These tables are for use with Problem 4 of Homework 3. Use the tables to indicate MARIE program execution as in Figure 4.14 in the textbook. Portions of the tables are already completed. Incorporate with your other solutions to submit a single PDF file for the homework assignment.

(a) Load 105

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step** | **RTN** | **PC** | **IR** | **MAR** | **MBR** | **AC** |
| (initial values) |  | 100 | ― | ― | ― | ― |
| Fetch | MAR ← PC | 100 | ― | 100 | ― | ― |
|  | IR ← M[MAR] | 100 | 1105 | 100 | ― | ― |
|  | PC ← PC + 1 | 101 | 1105 | 100 | ― | ― |
| Decode | MAR ← IR[11-0] | 101 | 1105 | 105 | ― | ― |
|  | (Decode IR[15-12]) | 101 | 1105 | 105 | ― | ― |
| Get operand | MBR ← M[MAR] | 101 | 1105 | 105 | 00F3 | ― |
| Execute | AC ← MBR | 101 | 1105 | 105 | 00F3 | 00F3 |

(b) Subt 104

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step** | **RTN** | **PC** | **IR** | **MAR** | **MBR** | **AC** |
| (initial values) |  | 101 | 1105 | 105 | 00F3 | 00F3 |
| Fetch | MAR ← PC | 101 | 1105 | 101 | 00F3 | 00F3 |
|  | IR ← M[MAR] | 101 | 4104 | 101 | 00F3 | 00F3 |
|  | PC ← PC + 1 | 102 | 4104 | 101 | 00F3 | 00F3 |
| Decode | MAR ← IR[11-0] | 102 | 4104 | 104 | 00F3 | 00F3 |
|  | (Decode IR[15-12]) | 102 | 4104 | 104 | 00F3 | 00F3 |
| Get operand | MBR ← M[MAR] | 102 | 4104 | 104 | 00A3 | 00F3 |
| Execute | AC ← AC - MBR | 102 | 4104 | 104 | 00A3 | 0050 |

(c) Store 104

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step** | **RTN** | **PC** | **IR** | **MAR** | **MBR** | **AC** |
| (initial values) |  | 102 | 4104 | 104 | 00A3 | 0050 |
| Fetch | MAR ← PC | 102 | 4104 | 102 | 00A3 | 0050 |
|  | IR ← M[MAR] | 102 | 2104 | 102 | 00A3 | 0050 |
|  | PC ← PC + 1 | 103 | 2104 | 102 | 00A3 | 0050 |
| Decode | MAR ← IR[11-0] | 103 | 2104 | 104 | 00A3 | 0050 |
|  | (Decode IR[15-12]) | 103 | 2104 | 104 | 00A3 | 0050 |
| Get operand | (not necessary) | 103 | 2104 | 104 | 00A3 | 0050 |
| Execute | MBR ← AC | 103 | 2104 | 104 | 0050 | 0050 |
|  | M[MAR] ← MBR | 103 | 2104 | 104 | 0050 | 0050 |