instructions.txt: Test Bench Explanations and Expected Values:

|  |  |
| --- | --- |
| 00000000 | Print contents of R0; **Printout is :“ 0”**; R0 is initialized to ‘0’. |
| 00001000 | Print contents of R1; **Printout is: “ 0”**; R1 is initialized to ‘0’. |
| 00010000 | Print contents of R2; **Printout is: “ 0”**; R2 is initialized to ‘0’. |
| 00011000 | Print contents of R3; **Printout is: “ 0”**; R3 is initialized to ‘0’. |
| 11000001 | Load immediate value of ‘1’ into R0. |
| 00000000 | Print contents of R0; **Printout is: “ 1”**; |
| 11010111 | Load immediate value of ‘7’ into R1. |
| 00001000 | Print contents of R1; **Printout is: “ 7”**; |
| 11101000 | Load immediate value of ‘-8’ into R2. |
| 00010000 | Print contents of R2; **Printout is: “ -8”**; |
| 01110001 | R3 = R0 + R1; (Start simple add/sub tests.) |
| 00011000 | Print contents of R3; **Printout is: “ 8”**; |
| 01111111 | R3 = R3 + R3; |
| 00011000 | Print contents of R3; **Printout is: “ 16”**; |
| 01111110 | R3 = R3 + R2; |
| 00011000 | Print contents of R3; **Printout is: “ 8”**; |
| 01111110 | R3 = R3 + R2; |
| 01111110 | R3 = R3 + R2; |
| 00011000 | Print contents of R3; **Printout is: “ -8”**; |
| 10110100 | R3 = R1 – R0; |
| 00011000 | Print contents of R3; **Printout is: “ 6”**; |
| 11000111 | Load immediate value of ‘7’ into R0. |
| 10111100 | R3 = R3 – R0; |
| 00011000 | Print contents of R3; **Printout is: “ -1”**; |
| 00011001 | Print contents of R3; **Printout is: “ -1”**; Bottom three bits are “don’t care.” |
| 00011010 | Print contents of R3; **Printout is: “ -1”**; Bottom three bits are “don’t care.” |
| 00011100 | Print contents of R3; **Printout is: “ -1”**; Bottom three bits are “don’t care.” |
| 00101100 | Skip 1 instruction if R3 = R0; They are not equal, so no instruction is skipped.  (Start skip instruction tests.) |
| 00000000 | Print contents of R0; **Printout is :“ 7”**. |
| 00111100 | Skip 2 instructions if R3 = R0; They are not equal, so no instructions are skipped. |
| 11000001 | Load immediate value of ‘1’ into R0. |
| 11110001 | Load immediate value of ‘1’ into R3. |
| 00000000 | Print contents of R0; **Printout is :“ 1”**. |
| 00011000 | Print contents of R3; **Printout is :“ 1”**. |
| 00101100 | Skip 1 instruction if R3 = R0; They are equal, so next instruction is skipped. |
| 00000000 | Print contents of R0; Nothing will be printed since it is skipped. |
| 00101100 | Skip 1 instruction if R3 = R0; They are equal, so next instruction is skipped. |
| 01111110 | R3 = R3 + R2; This instruction will be skipped. |
| 00011000 | Print contents of R3; **Printout is :“ 1”**. R3’s value was not changed because of the skip. |
| 00101100 | Skip 1 instruction if R3 = R0; They are equal, so next instruction is skipped. |
| 10111110 | R3 = R3 - R2; This instruction will be skipped. |
| 00011000 | Print contents of R3; **Printout is :“ 1”**. R3’s value was not changed because of the skip. |
| 00101100 | Skip 1 instruction if R3 = R0; They are equal, so next instruction is skipped. |
| 00101100 | Skip 1 instruction if R3 = R0; This instruction will be skipped. |
| 11011111 | Load immediate value of ‘-1’ into R1. |
| 00001000 | Print contents of R1; **Printout is :“ -1”**. Last skip instruction was skipped. |
| 00111100 | Skip 2 instructions if R3 = R0; They are equal, so next 2 instructions are skipped. |
| 00000000 | Print contents of R0; Nothing will be printed since it is skipped. |
| 01110101 | R3 = R1 + R1; This instruction will be skipped. |
| 00011000 | Print contents of R3; **Printout is :“ 1”**. R3’s value was not changed because of the skip. |
| 00111100 | Skip 2 instructions if R3 = R0; They are equal, so next 2 instructions are skipped. |
| 10110111 | R3 = R1 - R3; This instruction will be skipped. |
| 00111100 | Skip 2 instructions if R3 = R0; This instruction will be skipped. |
| 00011000 | Print contents of R3; **Printout is :“ 1”**. R3’s value was not changed because of the skip. |
| 11000000 | Load immediate value of ‘0’ into R0. (Starting more thorough add/sub tests now.) |
| 11010000 | Load immediate value of ‘0’ into R1. |
| 11100000 | Load immediate value of ‘0’ into R2. |
| 11110000 | Load immediate value of ‘0’ into R3. |
| 01100100 | R2 = R1 + R0; |
| 00010000 | Print contents of R2; **Printout is :“ 0”**. |
| 10100100 | R2 = R1 - R0; |
| 00010000 | Print contents of R2; **Printout is :“ 0”**. |
| 11000001 | Load immediate value of ‘1’ into R0. |
| 01100100 | R2 = R1 + R0; |
| 00010000 | Print contents of R2; **Printout is :“ 1”**. |
| 11000010 | Load immediate value of ‘2’ into R0. |
| 11010101 | Load immediate value of ‘5’ into R1. |
| 01100100 | R2 = R1 + R0; |
| 00010000 | Print contents of R2; **Printout is :“ 7”**. |
| 01101010 | R2 = R2 + R2; (R2 = 14) |
| 01101010 | R2 = R2 + R2; (R2 = 28) |
| 01101010 | R2 = R2 + R2; (R2 = 56) |
| 01101010 | R2 = R2 + R2; (R2 = 112) |
| 01101010 | R2 = R2 + R2; (R2 = -32 [0b11100000], overflow has occurred.) |
| 00010000 | Print contents of R2; **Printout is :“ -32”**. |
| 11001111 | Load immediate value of ‘-1’ into R0. |
| 11010010 | Load immediate value of ‘2’ into R1. |
| 01100100 | R2 = R1 + R0; |
| 00010000 | Print contents of R2; **Printout is :“ 1”**. |
| 11001011 | Load immediate value of ‘-5’ into R0. |
| 11010100 | Load immediate value of ‘4’ into R1. |
| 01100100 | R2 = R1 + R0; |
| 00010000 | Print contents of R2; **Printout is :“ -1”**. |
| 11001111 | Load immediate value of ‘-1’ into R0. |
| 11011001 | Load immediate value of ‘-7’ into R1. |
| 01100100 | R2 = R1 + R0; |
| 00010000 | Print contents of R2; **Printout is :“ -8”**. |
| 11000011 | Load immediate value of ‘3’ into R0. |
| 11011110 | Load immediate value of ‘-2’ into R1. |
| 01100100 | R2 = R1 + R0; |
| 00010000 | Print contents of R2; **Printout is :“ 1”**. |
| 11000010 | Load immediate value of ‘2’ into R0. |
| 11011010 | Load immediate value of ‘-6’ into R1. |
| 01100100 | R2 = R1 + R0; |
| 00010000 | Print contents of R2; **Printout is :“ -4”**. |
| 11101000 | Load immediate value of ‘-8’ into R2. |
| 01101010 | R2 = R2 + R2; (R2 = -16) |
| 01101010 | R2 = R2 + R2; (R2 = -32) |
| 01101010 | R2 = R2 + R2; (R2 = -64) |
| 01101010 | R2 = R2 + R2; (R2 = -128) |
| 01111010 | R3 = R2 + R2; (R2 = 0, underflow has occurred.) |
| 00011000 | Print contents of R3; **Printout is :“ 0”**. |
| 11000001 | Load immediate value of ‘1’ into R0. |
| 10111000 | R3 = R2 - R0 (R3 = 127 [0b01111111] underflow has occurred.) |
| 00011000 | Print contents of R3; **Printout is :“ 127”**. |
| 11000010 | Load immediate value of ‘2’ into R0. |
| 11010001 | Load immediate value of ‘1’ into R1. |
| 10100100 | R2 = R1 - R0; |
| 00010000 | Print contents of R2; **Printout is :“ -1”**. |
| 11000011 | Load immediate value of ‘3’ into R0. |
| 11010101 | Load immediate value of ‘5’ into R1. |
| 10100100 | R2 = R1 - R0; |
| 00010000 | Print contents of R2; **Printout is :“ 2”**. |
| 11000110 | Load immediate value of ‘6’ into R0. |
| 11010111 | Load immediate value of ‘7’ into R1. |
| 10100100 | R2 = R1 - R0; |
| 00010000 | Print contents of R2; **Printout is :“ 1”**. |
| 11000110 | Load immediate value of ‘6’ into R0. |
| 11010111 | Load immediate value of ‘7’ into R1. |
| 10100100 | R2 = R1 - R0; |
| 00010000 | Print contents of R2; **Printout is :“ -1”**. |
| 11001110 | Load immediate value of ‘-2’ into R0. |
| 11010101 | Load immediate value of ‘5’ into R1. |
| 10100100 | R2 = R1 - R0; |
| 00010000 | Print contents of R2; **Printout is :“ 7”**. |
| 11000010 | Load immediate value of ‘2’ into R0. |
| 11011010 | Load immediate value of ‘-6’ into R1. |
| 10100100 | R2 = R1 - R0; |
| 00010000 | Print contents of R2; **Printout is :“ -8”**. |
| 11001011 | Load immediate value of ‘-5’ into R0. |
| 11011001 | Load immediate value of ‘-7’ into R1. |
| 10100100 | R2 = R1 - R0; |
| 00010000 | Print contents of R2; **Printout is :“ -2”**. |