

Test Name	Description	Use Case Reference	Inputs	Expected Output	Success Criteria	Failure Criteria
test_read_valid_input	Reads a valid integer into memory	READ (10XX)	Memory[5] = 0, Input = 1234	Memory[5] = 1234	Memory updated correctly	Invalid input not handled
test_read_invalid_input	Handles non-integer input correctly	READ (10XX)	Memory[5] = 0, Input = "abc"	Error message	Error thrown	Program crashes
test_write_output	Writes a stored value to output	WRITE (11XX)	Memory[10] = 5678	Output contains "5678"	Correct output captured	Incorrect/missing output
test_write_uninitialized	Writing from uninitialized memory	WRITE (11XX)	Memory[10] = None	Error message	Error thrown	Undefined behavior
test_load_valid	Loads a value into accumulator	LOAD (20XX)	Memory[5] = 100	Accumulator = 100	Correct value loaded	Incorrect value loaded
test_load_invalid_address	Attempts to load from invalid memory	LOAD (20XX)	Memory[150] (out of bounds)	Error message	Error thrown	No error, undefined behavior
test_store_valid	Stores accumulator value in memory	STORE (21XX)	Accumulator = 200	Memory[10] = 200	Correct value stored	Incorrect value stored
test_store_invalid_address	Attempts to store to invalid memory	STORE (21XX)	Memory[150]	Error message	Error thrown	Undefined behavior
test_addition_valid	Adds a valid number to accumulator	ADD (30XX)	Accumulator = 10, Memory[5] = 15	Accumulator = 25	Correct sum calculated	Incorrect result
test_addition_invalid_memory	Attempts to add from invalid address	ADD (30XX)	Memory[150]	Error message	Error thrown	Undefined behavior
test_subtraction_valid	Subtracts a valid number	SUBTRACT (31XX)	Accumulator = 20, Memory[5] = 5	Accumulator = 15	Correct result	Incorrect result
test_subtraction_invalid_memory	Attempts to subtract from invalid memory	SUBTRACT (31XX)	Memory[150]	Error message	Error thrown	Undefined behavior
test_divide_valid	Divides correctly	DIVIDE (32XX)	Accumulator = 20, Memory[5] = 5	Accumulator = 4	Correct result	Incorrect result
test_divide_by_zero	Division by zero	DIVIDE (32XX)	Memory[5] = 0	Error message	Error thrown	Undefined behavior
test_multiply_valid	Multiplies correctly	MULTIPLY (33XX)	Accumulator = 4, Memory[5] = 3	Accumulator = 12	Correct result	Incorrect result
test_multiply_invalid_memory	Attempts to multiply with invalid memory	MULTIPLY (33XX)	Memory[150]	Error message	Error thrown	Undefined behavior
test_branch_valid	Changes program counter	BRANCH (40XX)	PC = 0, Memory[0] = 4020	PC = 20	Correct PC updated	Incorrect PC update
test_branch_invalid	Branch to invalid memory	BRANCH (40XX)	Memory[150]	Error message	Error thrown	Undefined behavior
test_branchneg_valid	Branches when accumulator < 0	BRANCHNEG (41XX)	Accumulator = -5, Memory[0] = 4120	PC = 20	Correct PC updated	No branch occurred
test_branchneg_no_branch	Does not branch when accumulator >= 0	BRANCHNEG (41XX)	Accumulator = 5, Memory[0] = 4120	PC unchanged	Correct behavior	Incorrect branch occurred
test_branchzero_valid	Branches when accumulator is 0	BRANCHZERO (42XX)	Accumulator = 0, Memory[0] = 4220	PC = 20	Correct PC updated	No branch occurred
test_branchzero_no_branch	Does not branch when accumulator != 0	BRANCHZERO (42XX)	Accumulator = 5, Memory[0] = 4220	PC unchanged	Correct behavior	Incorrect branch occurred
test_halt_execution	Halts program execution	HALT (43XX)	Memory[0] = 4300	Program stops	No further execution	Execution continued