Code Line # (Starting from #10)	A-register	D-register	M-Register	ALU	Data memory	Instruction Memory	Program Counter	Control/Address/Data bus
#10	The A-register is set to 17	NA	M - register points to the memory that stores the variable I, RAM [17]	NA	The data memory is accessed to read RAM [17] that stores the value of i	The instruction memory input is set to address of #11	The program counter is set to PC++ -> address of #11 instruction	The control bits are sent to A register to load the value 17 The address of variable i is put into the address bus to access the memory location. The control bits are sent to the PC to increment its value by 1
#11	NA	The D - register is set to the value in RAM [17]	M - register points to the memory that stores the variable I, RAM [17]	NA	NA	The instruction input is set to the address of #12	The program counter is set to PC++ -> address of #12 instruction	The control bits are sent to the D register to load the value of RAM [17] Control bits are sent to PC to increment its value.
#12	The A-register is set to 18	NA	M - register points to the memory that stores the variable i, RAM [18]	NA	The data memory is accessed to read RAM [18] that stores the value of i.	The instruction memory input is set to address of #13	The program counter is set to PC++ -> address of #13 instruction	The control bits are sent to the A-register to load the value 18 The address of sum is put into the address bus to access the memory location. The control bits are sent to the PC to increment its value by 1
#13	NA	NA	M - register points to the memory that stores the variable i, RAM [18] is incremented by the value in the D register	ALU computes M+D as output.	The value of M + D is written to the data memory, at RAM [18]	The instruction n input set to address of #14	The program counter is set to PC++ -> address of #14 instruction on	Control bits to send to ALU to load M and D register. ALU outputs M + D to M through data bus The control bits are sent to the PC to increment its value by 1.

#14	NA	D is used as the first input to the ALU. The output of the ALU is stored in D.	NA	The ALU Outputs the sum of the value in the D register and 1	NA	The Instruction input set to address of #15	The program counter is set to PC++ -> address of #15 instruction	Control bits sent To ALU to load D. The control bits Are sent to the ALU, To calculate and output D + 1. ALU output is sent via the data bus to A/D/M with control Bits making D commit to value. The control bits are sent to the PC to increment its value by 1.
#15	The A – register is set to 17	NA	M register Points to the memory that stores the variable I, RAM[17]	NA	The data memory is accessed to read RAM[17] that stores the value of i	Instruction input set to address of #16	The program counter is set to PC++ -> address of #16 instruction	Control bits are sent to the A register to load value 17. Data memory is accessed via address & data bus to read/load RAM[17].The control bits are sent to the PC to increment its value by 1.
#16	NA	NA	The output of the ALU is stored in M	The ALU outputs the value in the D register	The value in the D register is written to the data memory, at RAM[17].	The instruction input set to address of #17	The program counter is set to PC++ -> address of #17 instruction	The control bits Are sent to the ALU, Which will output the Value of the D-register. The control bits are sent to the RAM to load the output of the ALU to the selected register, RAM[17]. The control bits are sent to the PC to increment its value by 1.
#17	The A register is set to 16	NA	M register points to the memory that stores the variable n, RAM[16]	NA	The data memory is accessed to read RAM[16] that stores the value of n	The instructio n input set to address of #18	The program counter is set to PC++ -> address of #18 instructi on	Control bits are sent to the A register to load value 16. Data memory is accessed via address & data bus to read/load RAM[16]. The control bits are sent to the PC to increment its value by 1.

#18	NA	ALU output is loaded into D	The M register, RAM[16], is read	The ALU outputs the value of M – D	Data memory has already been accessed at RAM[16] and set as the M input previously	The instruction input set to address of #19	The program counter is set to PC++ -> address of #19 instruction	Control bits sent via control bus to ALU to load D register and M input. The control bits are sent to the ALU, to output the value of M – D. Control bits are sent to the D register, to load the output of the ALU. The control bits are sent to the PC to increment its value by 1.
#19	The A register is set to 21 (#24 in the code)	NA	M register points to the uninitialized memory RAM[21]	NA	The data memory is accessed to read RAM[21] that stores an uninitialized value	The instruction input set to address of #20	The program counter is set to PC++ -> address of #20 instruction	The control bits are sent to A register to load the value 21 The address of uninitialized memory is put into the address bus to access the memory location. RAM[21] is read using the data bus. The control bits are sent to the PC to increment its value by 1.
#20	NA	NA	NA	The ALU outputs the value of D	NA	The instruction input set to address of #21	The program counter is set to PC++ -> address of #21 instruction	The control bits are sent to the ALU, which will output the value of D (0). The control bits will be sent to the PC to increment its value by 1 (jump condition JLT is false, as 0 is not less than 0).