Question 8.31

a)

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| Location | Number | Instruction | Comment |
| 00 | +1011 | (READ A) | Read input A into memory location 11 |
| 01 | +2011 | (LOAD A) | Load word from memory location 11 to accumulator |
| 02 | +4110 | (BRANCH NEGATIVE TO 10) | If accumulator contains negative number, halt the execution |
| 03 | +1012 | (READ B) | Read input B into memory location 12 |
| 04 | +2012 | (LOAD B) | Load word from memory location 12 to accumulator |
| 05 | +4109 | (BRANCH NEGATIVE TO 09) | If B contains negative number, write the output and halt the execution |
| 06 | +3011 | (ADD A) | Add the word on location 11 to accumulator |
| 07 | +2111 | (STORE A) | Write the word in accumulator into memory location 11 |
| 08 | +4003 | (BRANCH TO B) | Go to memory location 03 |
| 09 | +1111 | (WRITE A) | Print the word stored in memory location 11 |
| 10 | +4300 | (HALT) | Stop the execution of program |
| 11 | +0000 | (VARIABLE A) | Variable for input |
| 12 | +0000 | (VARIABLE B) | Variable for storing the calculation |

b)

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| Location | Number | Instruction | Comment |
| 00 | +1020 | (READ A) | Read the input and store in memory location 20 |
| 01 | +1021 | (READ B) | Read the input and store in memory location 21 |
| 02 | +2020 | (LOAD A) | Load the word in memory location 20 to the accumulator |
| 03 | +3020 | (ADD A) | Add the word in location 20 in accumulator |
| 04 | +2120 | (STORE A) | Store the word in accumulator into memory location 18 |
| 05 | +2020 | (LOAD C) | Load word (counter) in memory location 20 to accumulator |
| 06 | +3121 | (SUBTRACT D) | Subtract the word in memory location 21 from accumulator |
| 07 | +4210 | (BRANCH ZERO TO 10) | If accumulator contains zero then go to memory location 10 |
| 08 | +1120 | (WRITE C) | Update the content to memory location 20 |
| 09 | +4102 | (BRANCH TO 02) | Go to memory location 02 |
| 10 | +2022 | (LOAD A) | Load the word in memory location 22 to accumulator |
| 11 | +3219 | (DIVIDE COUNT) | Divide the word in accumulator from the word in memory location 19 |
| 12 | +2122 | (STORE A) | Store the word in accumulator in memory location 22 |
| 13 | +1122 | (WRITE A) | Write the word in memory location 22 to screen |
| 14 | +4300 | (HALT) | Stop the execution of program |
| 15 | +0007 | (VARIABLE COUNT) | Total number of inputs |
| 16 | +0005 | (VARIABLE COUNTER) | Variable used for counting |
| 17 |  |  |  |
| 18 |  |  |  |
| 19 |  |  |  |
| 20 | +0000 | (VARIABLE A) | Stores user input A |
| 21 | +0000 | (VARIABLE B) | Stores user input B |
| 22 | +0006 | (INTEGER 1) | Stores integer 1 |
| 23 |  |  |  |

c)

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| Location | Number | Instruction | Comment |
| 00 | +1025 | (READ A) | Read the word and store in location. 25 |
| 01 | +2025 | (LOAD A) | Load the word A to accumulator |
| 02 | +3124 | (SUBTRACT 1) | Subtract the value 1 |
| 03 | +2123 | (STORE C) | Store the word in accumulator to memory location 23 as it’s a counter |
| 04 | +1025 | (READ A) | Read next input and store it memory location 25 |
| 05 | +2025 | (LOAD A) | Load it to accumulator |
| 06 | +2126 | (STORE TO MAX) | Let the first integer be largest initially |
| 07 | +2023 | (LOAD COUNTER) | Load counter to accumulator |
| 08 | +3124 | (SUBTRACT 1) | Subtract 1 from accumulator |
| 09 | +2123 | (STORE COUNTER) | Update the counter |
| 10 | +1025 | (READ A) | Read the word and store it to memory location 25 |
| 11 | +2025 | (LOAD A) | Load the word in ml 25 to accumulator |
| 12 | +3126 | (SUBTRACT MAX) | Subtract the word in ml 26 from accumulator |
| 13 | +4120 | (BRANCH NEGATIVE to 20) | If the account contains negative value, then current MAX is still the greatest so go to ml 20 |
| 14 | +2025 | (LOAD A) | Since current input is greater load it to accumulator |
| 15 | +2126 | (STORE TO 22) | Now this is the greatest number found |
| 16 | +2023 | (LOAD COUNTER) | Now load the memory location 23 which is a counter to accumulator |
| 17 | +3124 | (SUBTRACT 1) | Sub 1 from accumulator |
| 18 | +4221 | (BRANCH ZERO to 21) | If the counter is zero then halt the execution |
| 19 | +4010 | (BRANCH TO 10) | Go to memory location 10 to receive the next input |
| 20 | +4016 | (BRANCH TO 16) | Go to memory location 16 to update the counter since the current MAX value is actually the MAX value till now |
| 21 | +1126 | (WRITE MAX) | Write the word in memory location 26 to screen |
| 22 | +4300 | (HALT) | Stop the execution |
| 23 | +0000 | (VARIABLE COUNTER) | Stores updated value of counter |
| 24 | +0001 | (VARIABLE 1) | Stores integer 1 |
| 25 | +0000 | (VARIABLE A) | Stores user input value |
| 26 | +0000 | (VARAIBLE MAX) | Current MAX value |