Units 4, 5, 6
Data Manipulation

1. Write a piece of code which does the follows (all in Hex). If the value stored in memory location 2A is 01, then place the value FF in memory location 27; otherwise, put the value 00 in memory location 27 and reverse the contents of the memory call at address 7F. (That is, the final bit pattern at address 7F when read from left to right should agree with the original pattern then read from right to left.)

Op-code	Operand	Description
1	RXY	LOAD the register R with the bit pattern in memory cell XY.
2	RXY	LOAD the register R with bit pattern XY.
3	RXY	STORE the bit pattern in register R into memory cell XY.
5	RST	ADD the bit patterns as 2's complement in registers S and T and leave the result in register R.
6	RST	ADD the bit patterns in registers S and T as though they were two's complement representations and leave the result in register R.
7	RST	OR the bit patterns in registers S and T and place the result in register R.
8	RST	AND the bit patterns in registers S and T and place the result in register R.
9	RST	XOR the bit patterns in registers S and T and place the result in register R.
A	R0X	ROTATE the bit pattern in register R one bit to the right X times. Each time place the bit that started at the low-order end at the high-order end.
B	RXY	JUMP to the instruction located in the memory cell at address XY if the bit pattern in register R is equal to the bit pattern in register number 0. Otherwise, continue with the normal sequence of execution. (The jump is implemented by copying XY into the program counter during the execute phase.)
C	000	HALT execution.

2. The program counter is now set at 1E. What would be to value stored in register 3 (in decimal) when the program halts? You need to write down contents in registers, PC and IR in every step.

Address	Content
1E	14
1F	24
20	10
21	26
22	23
23	2F
24	11
25	2F
26	12
27	25
28	A0
29	20
2A	32
2B	25
2C	53
2D	13
2E	A0
2F	40
30	B4
31	24
32	C0
33	00

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1	RXY	LOAD the register R with the bit pattern in memory cell XY.
2	RXY	LOAD the register R with bit pattern XY.
3	RXY	STORE the bit pattern in register R into memory cell XY.
5	RST	ADD the bit patterns as 2's complement in registers S and T and leave the result in register R.
A	0R0	Increment the bit pattern in register R by 1.
B	RXY	JUMP to the instruction located in the memory cell XY if the bit pattern in register R is equal to that in register 0.
C	000	HALT.