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ECE 375 hw 1

1a There are 256 opcodes, 2^8=256. The opcode is 8 bits long, the register field is 5 bits and the address field is 17 bits.

1b PC: 17 bits

MAR:17 bits

MDR:32 bits

IR:8 bits

AC:32 bits

2

1. MDR <- M(MAR)
2. TEMP <- MAR
3. MAR <- MDR
4. MDR <- AC
5. AC <- MAR
6. AC <- AC + 1
7. MDR <- AC
8. M(MAR) <- MDR

3

1. MAR <- PC
2. MDR <- M(MAR), PC <- PC + 1
3. IR <- MDR(Opcode), MAR <- MDR(address)
4. TEMP <- AC, MDR <- M(MAR)
5. AC <- MDR
6. AC <- AC + 1
7. MDR <- AC
8. M(MAR) <- MDR, AC <- AC +1
9. If (Z==1) Then PC <- PC +1, AC <- TEMP
   Some help obtained from the wiki page on the pdp-8

4

i. No changes in registers or data memory.
ii. Data memory at "0107" changes from "02" to "1B"

iii. Register x changes from "0106" to "0107" and Data memory "0107" is changed to "07". "0106" is left unchanged because x was pre-decremented.

iv. Register R1 changes from "05" to "00"

v. Y is changed to 00fa, because R29:R28 corresponds to Y, which is 102. (102)base16 – (8)base16 = (fa)base16

vi. Register 26 refers to the lower value of x which is "06". Sbr performs a logical or with a constant the result is placed back in register 26. So Register 26 changes to "01". X becomes "0101"