1. In class, we used a 2-to-4 decoder to select one of the four locations in the memory. However, Figure 3.20 in the textbook uses something different. Show that both of them are doing the same thing. (4)

**Answer**

The circuit used in Figure 3.20 is the circuit for the 2-to-4 decoder.

2. The following program is supposed to input from the keyboard 10 decimal digits, convert their ASCII codes into their binary representations, and store the binary values in 10 successive memory locations, starting at the address binary. However, it does not work. Why? (4)

```
LEA   R3, Binary
LD    R6, ASCII
LD    R7, Count   ; Initialize to 10
Again TRAP  x23   ; Get keyboard input
   ADD  R0, R0, R6  ; Strip ASCII template
   STR  R0, R3, #0  ; Store binary digit
   ADD  R3, R3, #1  ; Increment pointer
   ADD  R7, R7, #-1 ; Decrement Count
   BRP  Again       ; More characters?
HALT
ASCII .FILL #-48
Count .FILL #10
Binary .BLKW #10
```

**Answer**

The Count stored in R7 is erased by the TRAP call. The TRAP call stores its return address in R7.

3. How many TRAP service routines can be implemented in the LC-2?

**Answer**

The trap number is 8 bits wide, so $2^8$ service routines can be implemented.

4. Do question 9.3 on page 192 in the textbook.
5. Circle all the parts of the datapath that is responsible for performing the instruction

LDI R2, x1CC