

(25)

a) (i) 0.5×2

$$0000.1 \quad 2^0 \quad 1.0 \quad 1$$

$$.11 \times 2^4$$

$$127 + 1 = 128$$

1	0	0	0	0	0	0	1	2	1	6	4	3	2	1
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010000000100000 . ~

↑ ↑ ↑

sign bit exponent mantissa

The sign bit indicates whether it is a positive or negative number and the rest of the number is stored in the exponent and mantissa.

(ii) $45 =$

$$101101_{(2)}$$

64	32	16	8	4	2	1
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$$\begin{array}{r} 101101 \\ \swarrow \quad \searrow \\ 2 \quad 13 = D \end{array}$$

9 A B C D E
10 11 12 13

2D

14

7

(iii) $1110 - 0111$

$$1000 + 1$$

$$1001 \therefore$$

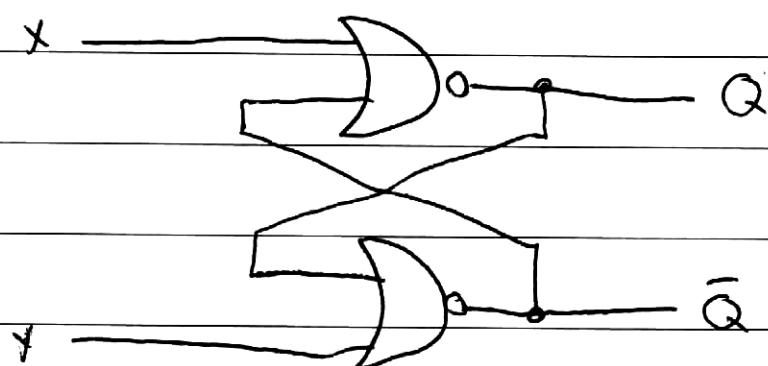
$$1110$$

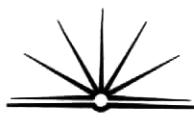
$$1001 +$$

$$\begin{array}{r} 10111 \\ \hline 111 \end{array}$$

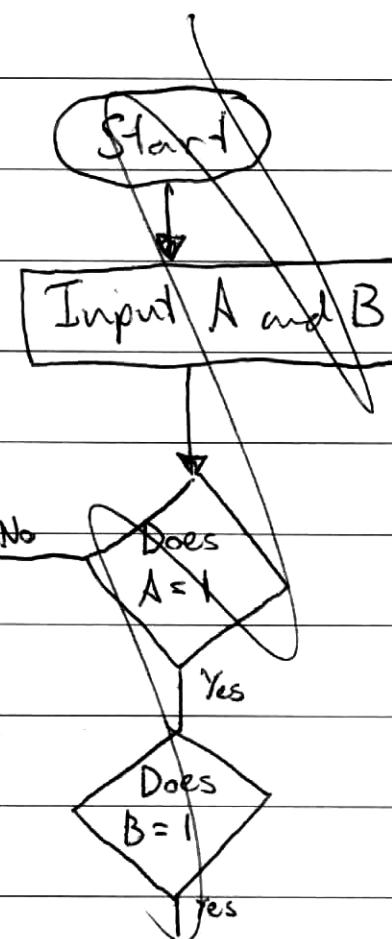
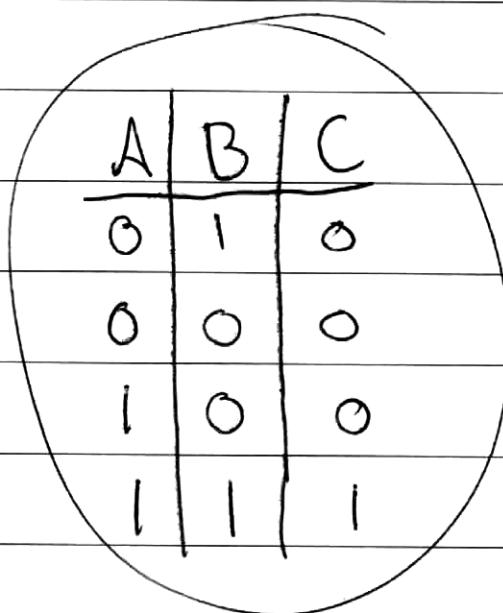
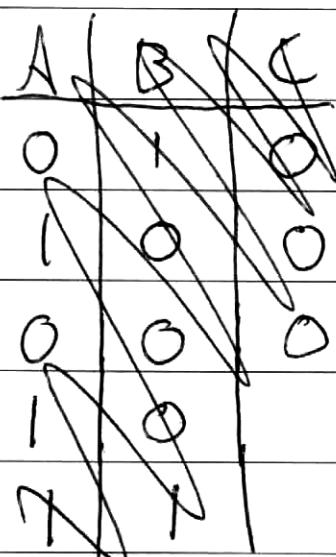
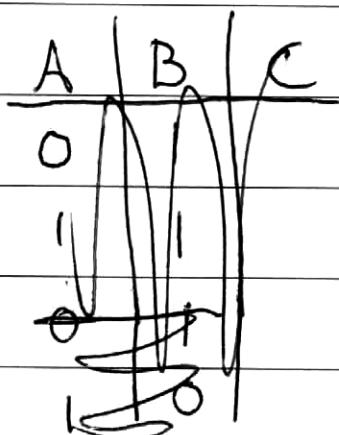
ignored
bit

b) (i) a flip-flop is a bi-stable binary device which is able to store one binary value

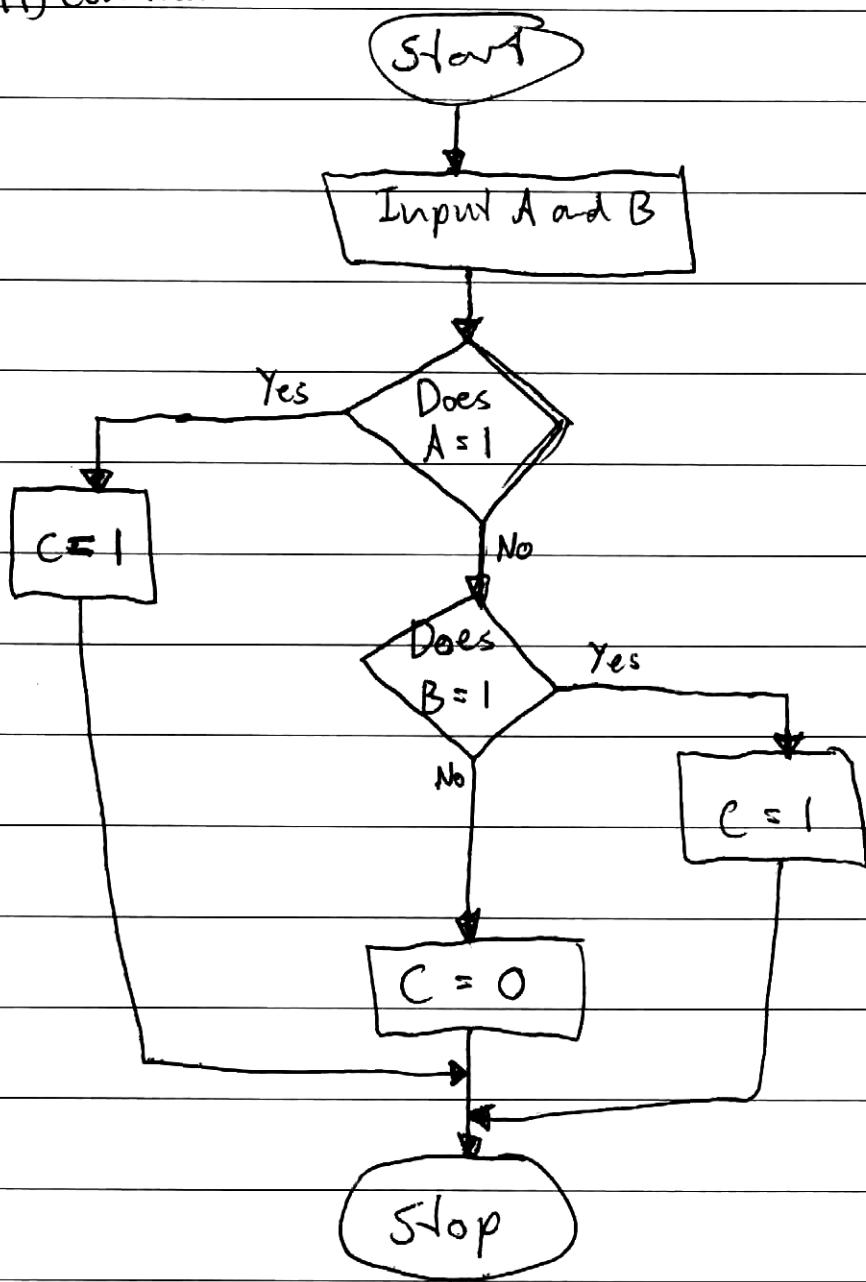




(ii)



(ii) continued.



c) The data stream from the ~~Door~~^{Scanner} to the computer contains the information gathered from the fingerprint. The header of this data stream contains information about the location of where it is to be sent and information about the body of the data stream, such as how it is to be read and information telling the computer if it is an image that it is black and white. As the information is received the trailer performs a ~~checksum~~ checksum which ensures the data received is correct and in the right order. The data is processed by the computer checking the fingerprint data with the stored set of fingerprint data. When a match is found a data stream is sent in response and much like the "fingerprint datastream".

The Header contains information of what is contained in the data stream but this is likely to be a boolean response as an ~~image~~ employees fingerprint will either match ~~a~~ a print on file or not and the trailer ~~is~~ also remains similar as it ensures the correct data is read. The key differences in the data streams are the body ~~of data~~ or data characters as the fingerprint stream is an image and the returned data stream is a boolean value.