SECTION - 1

Q2

Ans (a) 1. Number of bit strings of length eight that start with a 1 bit:
$2^7 = 128$.

(2) Number of bit strings of length eight that end with bit's 00: $2^6 = 64$.

(3.) Number of bit strings of length eight $2^5 = 32$ that start with a 1 bit and end with bits 00: $2^5 = 32$

Hence, the number is $128 + 64 - 32 = 160$.

(b).

1. One-to-one function (Injective function or injection): Let $f : X \to Y$ then $f$ is called one to one function if for distinct elements of X there are distinct image in Y i.e, f is one-to-one iff

$$f(x_1) = f(x_2) \text{ implies } x_1 = x_2 \ \forall\, x_1, x_2 \in X$$

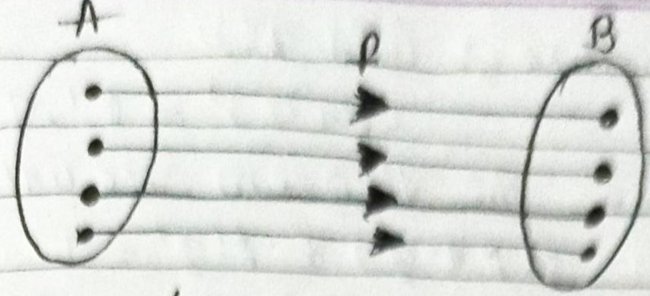



Fig-1 (One to one)

2. Onto function (Surjection or surjection functions):
Let $f: X \to Y$ then $f$ is called onto function iff for every element $y \in Y$
there is an element $x \in Y$ with $(f(x)) = y$ or
$f$ is onto iff Range $(f) = Y$.

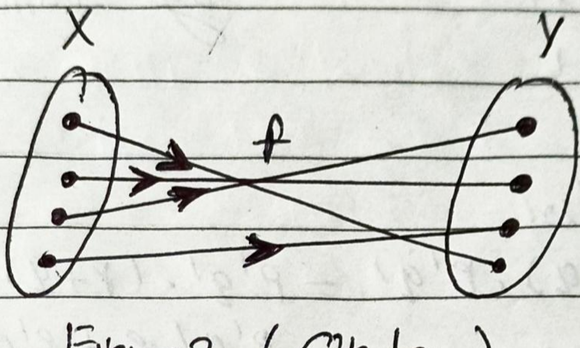
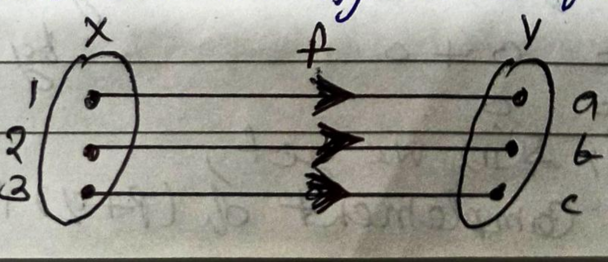



Fig-2 (Onto).

3. One to one onto function (Bijective function or bijection): A function which is both one to one and onto is called one to one onto function or bijective function.




one to one onto.

(c) To prove : ~~(p+q)'~~

$$(p+q)' = p'.q'$$

To prove the theorem we will show that

$$(p+q) + p'q' = 1$$

Consider $(p+q) + p'.q' = \{(p+q)+p'\}.\{p+q$

by Distributive law

$= \{(q+p)+p'\}.\{(p+q)+q'\}$

by Commutative law

$= \{q+(p+p')\}.\{p+(q+q')\}$

by Associative law

$= (q+1).(p+1)$ by Complement law

$= 1.1$ by Dominance law

$= 1$ .... (i)

Also Consider

$(p+q).p'q' = p'q'.(p+q)$ by Commu

$= p'q'.p + p'q'.q$ by

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$= p.(p'q').q' + p'.(q.q')$ by Comm

$= (p.p').q' + p'.(q.q')$ by Associati

$= 0.q' + p'.0$ by Complemen

$= q'.0 + p'.0$ by Commulativ

$= 0 + 0$ by Dom

$= 0$ ---- (

From (i) & (ii) we get,

$p'q'$ Complement of $(p+q)$ i.e $(p+q$