Section - 4

Q2 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 bits 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. $2^5 = 32$

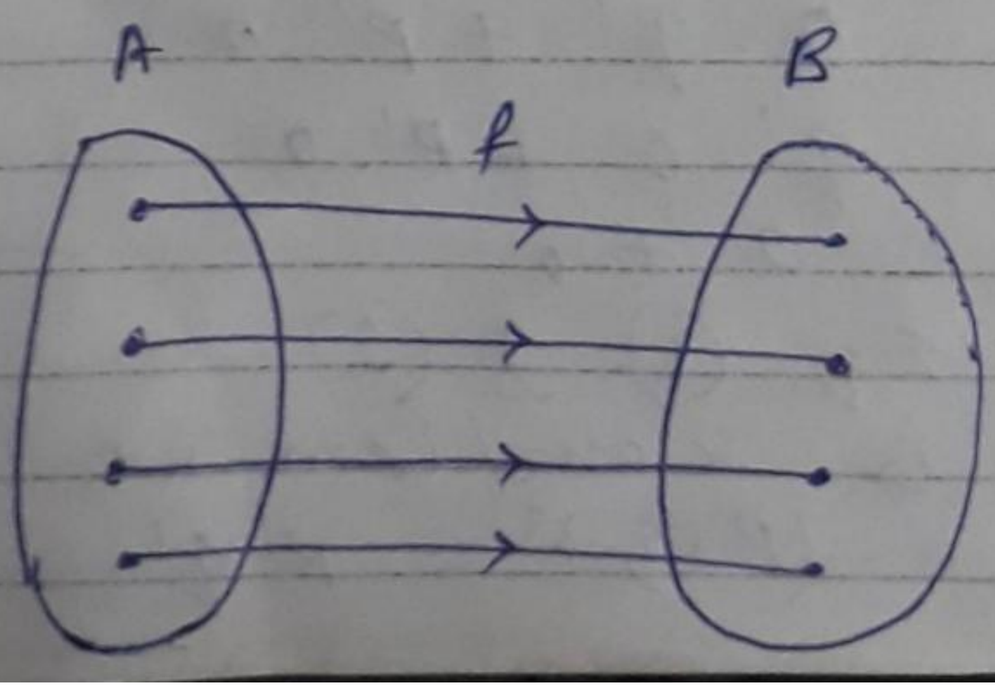
Hence the number is $128 + 64 - 32$

160

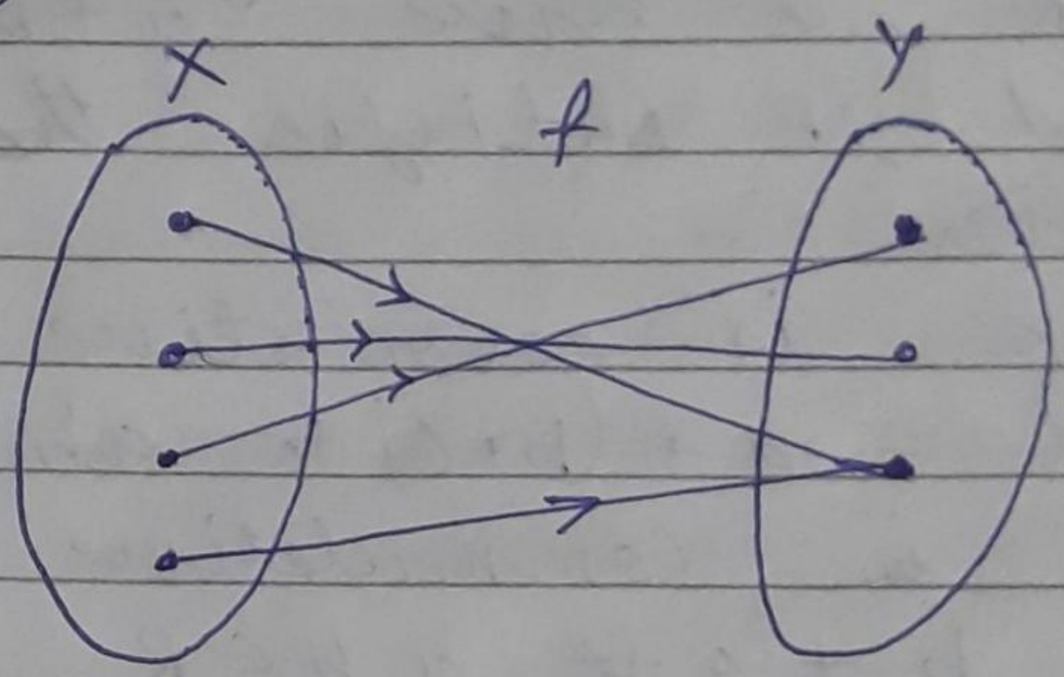
b) Injective, surjective & bijective function —

1) One - to One (function Injective) - Let $f : X \to Y$ then f is called one to one function if for distinct element of x there are distinct image in y

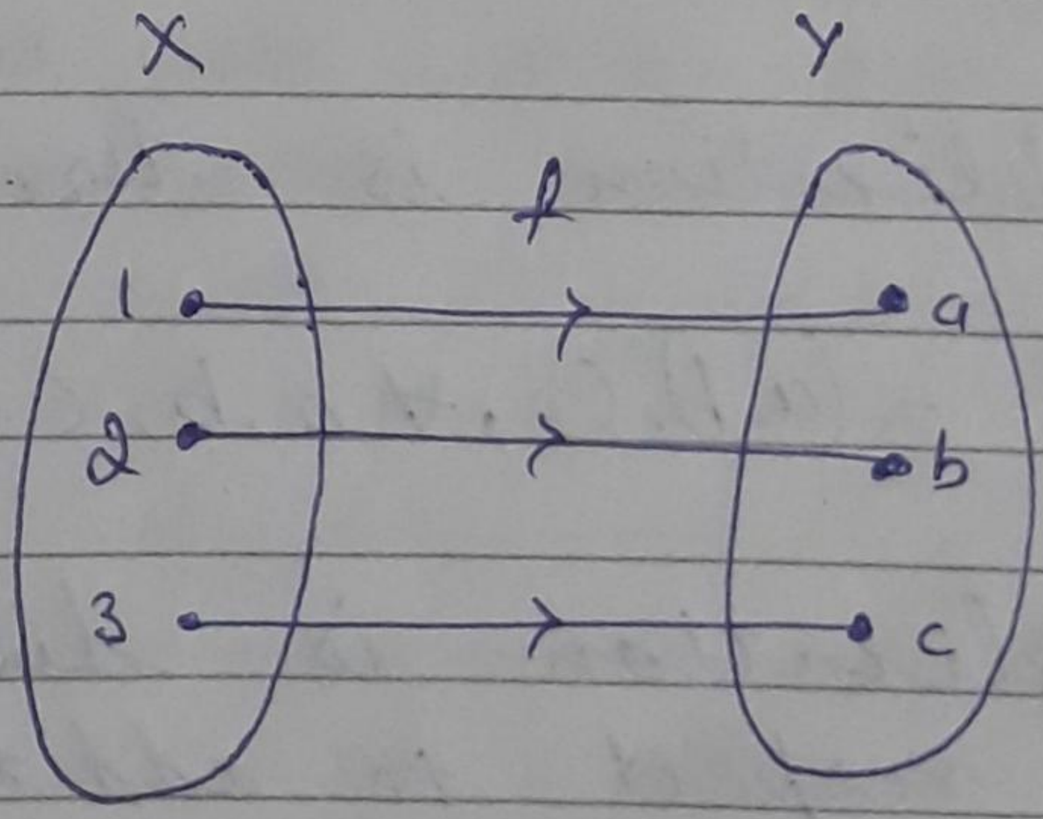
$f(x_1) = f(x_2)$, $x_1 = x_2 \; \forall \; x_1, x_2 \in X$



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



(iii) Bijective function or bijection) - A function with is both one to one and onto is called one to one onto function or bijective function.



$\neg(P \vee q)$ & $\neg P \vee q$ are logically equivalent.

$$(P+q)' = P' \cdot q'$$

To prove the theorem we will show

$$(P+q) + P' \cdot q' = 1$$

$$(P+q) + P' q' = \{(P+q) + P'\} \cdot \{(P+q) + q'\}$$

by distri. law.

$$= \{(q+P) + P'\} \cdot \{(P+q) + q'\}$$

by commutative law

$$= \{q + (P+P')\} \cdot \{P + (q+q')\}$$

by Associative law

$$(q+1) \cdot (P+1)$$
$$= 1 \cdot 1$$
$$= 1$$

by Dominance law

— (1)

Also consider

$$(P+q) \cdot P' \cdot q' = P' \cdot q' \cdot (P+q)$$
$$= P'q' \cdot P + P'q' \cdot q$$
$$= P \cdot (P'q') + P' \cdot (q'q) \quad \text{b.c.l}$$
$$\Rightarrow (P \cdot P') \cdot q' + P' \cdot (q \cdot q')$$
$$0 \cdot q' + P' \cdot 0$$
$$q' \cdot 0 + P' \cdot 0$$
$$0 + 0$$

— (2)

Eq (1) & (2)

$P'q'$ is complement of $(P+q)$ —

$$(P+q)' = P'q'$$