Secondly, we prove that $b = 0 \rightarrow ab = 0$.
Suppose that $b = 0$, then $ab = a.0 = 0$.
Therefore, the statement $(a = 0 \vee b = 0) \rightarrow ab = 0$ is tautology.

1.10.8 . Proof by Contradiction.
The contradiction is always false statement whatever the truth values of its components. Proof by contradiction is type of indirect proof.
The way of proof logical proposition **p** by contradiction start by supposing that ~p and then try to find sentence of type

$$R \wedge\sim R$$

where R is any sentence contain **p** or any pervious theorem or any axioms or any logical propositions.
This way supports by the tautology

$$\sim[\sim p \wedge (R \wedge\sim R)] \rightarrow p.$$

By this way we can also prove sentences of type $\forall x\, P(x)$ or $\exists x\, P(x)$ or (p → q) or (p ⟹q).

Example 1.10.9. Prove that $x \neq 0 \Longrightarrow x^{-1} \neq 0$, x is real number.
Proof.
Let p: $x \neq 0$,
q: $x^{-1} \neq 0$.
We must prove p ⟹q.
Suppose ~(p ⟹q) is true.
(1) ~ (p → q) is tautology, by def. of logical implication.
(2) p ∧ ~q is tautology, since ~ (p → q)≡p ∧ ~q
(3) $x \neq 0 \wedge x^{-1} = 0$.
(4) $x \cdot x^{-1} = 1 \neq 0$.
(5) $x \cdot x^{-1} = x \cdot 0 = 0$.
(6) $1 = 0$, from (4) and (5). This is contradiction, since $1 \neq 0 \wedge 1 = 0$.
Thus, the statement ~(p ⟹q) is not true. Therefore, p ⟹q.