How to prove false/true.

- If true : use math / step-by-step reasoning to prove it.
- If false : give one case where the hypothesis is satified, but the conclusion is false.

Ex. If I drink a liquid, then it is apple juice.

  False. Suppose I drink milk. Milk is a liquid. But it is not apple juice.

Ex.2  $a, b \in \mathbb{Z}$, If $a \mid 2b$, then $a \mid b$.

  False.  $a = 6$ & $b = 3$,  $6 \mid 2(3)$

  but  $6 \nmid 3$.

Ex.3  If $a \mid 3$ and $a \mid b$, then $a \mid (3 + b)$

  True. If $a \mid 3$, then $\exists k$ such that $ka = 3$.    ①

  Also since $a \mid b$, then $\exists m$ such that $ma = b$  ②

  $① + ② = ka + ma = (3 + b)$

  $a(k + m) = (3 + b)$

  Since $k + m$ is an int, Thus  $a \mid (3 + b)$  $\square$ / QED

  There is nothing else.

Ex.4  There is a block (mass M) on a table. Nothing is moving. If I push down on the block with a force $F \geq 0$ Newtons, then the normal force on the block is $\geq Mg$.

  True.

  $+ \hat{y}$

  $N$

  $F$  $Mg$

  Newton's 1st law $\Rightarrow F_{net_y} = 0 \Rightarrow 0 = N - F - Mg$

  So  $N = F + Mg$

  Since $F \geq 0$, thus $N \geq Mg$.

  $\square$.