4. It is found that |A + B| = |A|.This necessarily implies,

1) B = 0
2) A.B $\leq$ 0
3) A, B are perpendicular
4) A, B are antiparallel

Sol. 1) B = 0

We have to identity statements which are always true. It is given that $|\vec{A} + \vec{B}| = |\vec{A}|$, it could be true in two conditions that is either $\vec{B} = 0$ or $\vec{B} = -2\vec{A}$.

For forming a single condition we will multiply them, as either one of them is true it will uphold the necessary condition

We know $\vec{B} = 0, \vec{B} - 2\vec{A} = 0$ (from previous equations)

Therefore their magnitude's product will also be zero.

$|\vec{B}|(|\vec{B}| - 2|\vec{A}|) = 0$ (This will always be true)

$|\vec{B}|^2 - 2|\vec{A}||\vec{B}| = 0$

Therefore,

$|\vec{A}||\vec{B}| \leq 0$ (Equality is true for B = 0)

Above condition is always true