

Common proof errors

Note Title

2/19/2009

1. Not starting with "proof" or ending at "QED" points will be deducted on this from now on.

2. $\because u, v$ are li. indep,
 $\therefore \exists \alpha, \beta$ s.t. $\alpha u + \beta v = 0$

Note: \exists always α, β that make $\alpha u + \beta v = 0$
" u & v are li. indep" $\Rightarrow \alpha u + \beta v = 0$ imply $\alpha = \beta = 0$

3. Proof of " u, v are li. indep, A is nonsingular, then Au, Av are li. indep

Wrong proof: Let $\alpha u + \beta v = 0 \quad \alpha = \beta = 0$
 $\therefore 0 = A(\alpha u + \beta v) = \alpha(Au) + \beta(Av) = 0$
and $\alpha = \beta = 0 \quad \text{QED.}$

4. $\because w$ is a li. comb. of u & v .

$\therefore \exists \alpha, \beta$, not both zero, s.t. $w = \alpha u + \beta v$

Wrong

5. To prove " If w is a li. comb. of u, v , then (u, v, w) is li. dep.

Wrong proof: $\because w = \alpha u + \beta v$

$\therefore \alpha u + \beta v - w = 0$

and α, β are not both zero?

$\therefore (u, v, w)$ ~~is~~ is li. dep. QED

To prove " Au, Av are li. dep $\Rightarrow u, v$ are li. dep "

Wrong proof. Let $\alpha u + \beta v = 0$ (1) ✓

$$\therefore A(\alpha u + \beta v) = 0 \quad (2) \checkmark$$

$$\therefore \alpha(Au) + \beta(Av) = 0 \quad (3) \checkmark$$

Wrong $\left\{ \begin{array}{l} \therefore Au \text{ and } Av \text{ are li. dep} \quad (4) \checkmark \\ \therefore \alpha, \beta \text{ are not both zero} \quad (5) \end{array} \right.$

$\therefore u, v$ are li. dep. QED (6)