No.
Date

~~Proof of prop 36~~

Let us assume to $\bar{v}_1, \bar{v}_2, \ldots, \bar{v}_p$ are linearly dependent.

Let m be the smallest number such that $\bar{v}_1, \ldots, \bar{v}_m$ are linearly independent & $\bar{v}_{m+1}$ is a linear combination of the preceding vectors.

Then, $c_1\bar{v}_1 + \cdots + c_m\bar{v}_m = \bar{v}_{m+1}$ — (1)

Left multiplication by A

$$c_1 A\bar{v}_1 + c_2 A\bar{v}_2 + \cdots + c_m A\bar{v}_m = A\bar{v}_{m+1}$$

$\because$ v_i's are eigen vectors

$$c_1\lambda_1\bar{v}_1 + c_2\lambda_2\bar{v}_2 + \cdots + c_m\lambda_m\bar{v}_m = \lambda_{m+1}v_{m+1} \quad (2)$$

Multiplying (1) by λ_{m+1} & subtracting from (2), we get

$$c_1(\lambda_1 - \lambda_{m+1})\bar{v}_1 + \cdots + c_m(\lambda_m - \lambda_{m+1})\bar{v}_m = 0 \quad (3)$$

However, $\bar{v}_1, \ldots, \bar{v}_m$ are lin. indep. so all the coeff in (3) are
$0 \Rightarrow c_1(\lambda_1 - \lambda_{m+1}) = 0$,
$\Rightarrow$ ~~c~~ $c_1 = 0$ $\because$ λ's are given to be distinct

Similarly $c_2 = c_3 = \cdots = c_m = 0$
But from (1)
we get, $\bar{v}_{m+1} = 0$
But this is not possible as all the $\bar{v}$'s are eigen vectors.
$\Rightarrow$ By contradiction that $\{\bar{v}_1, \ldots, \bar{v}_p\}$ are linearly independent

H.P

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