(a) **DISAPROVE**

For seperable filters, it can be represented as product of two vectors.

$$\begin{bmatrix} 0 & 1 & 0 \\ 1 & -4 & 1 \\ 0 & 1 & 0 \end{bmatrix} = A \times B$$

$$= \begin{bmatrix} a \\ b \\ e \end{bmatrix} \times \begin{bmatrix} c & d & f \end{bmatrix}$$

$$= \begin{bmatrix} ac & ad & af \\ bc & bd & bf \\ ec & ed & ef \end{bmatrix}$$

$ac = 0$ ($a = 0$ or $c = 0$) $af = 0$ $\left(\begin{smallmatrix} a \neq 0 \\ f = 0 \end{smallmatrix}\right)$

But if $a = 0$ then $ad \neq 1$, if $f = 0$, $bf \neq 1$

So no vector A & B exist

∴ Laplacian is not a seperable filter.

(b) If a filter mask is a seperable filter, we can express it as 1-D convulation by associativity of convulation.

But Laplacian Mask is not a seperable Mask