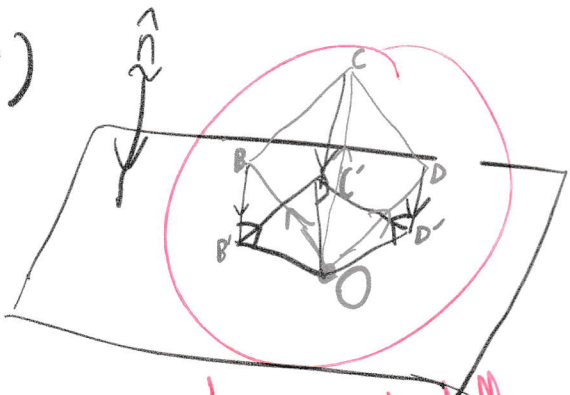
NEELU SARASWAT IBHATLA (SRNS2)

D1. (i)



Let O be on the plane.

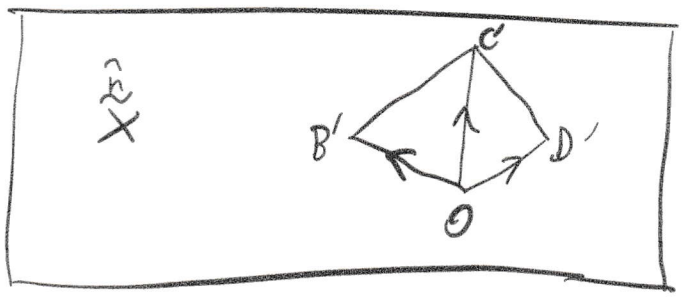
Drawing this plane from above:

not sure if follows

$\hat{n} = \frac{1}{\sqrt{2}}(0,-1,1)$

O B C D are all in the xy plane

only E is out in the middle



From the diagram,

$\overrightarrow{OB'} = \overrightarrow{OB} + \overrightarrow{BB'}$, $\overrightarrow{OC'} = \overrightarrow{OC} + \overrightarrow{CC'}$, $\overrightarrow{OD'} = \overrightarrow{OD} + \overrightarrow{DD'}$

$\overrightarrow{OB} = (2,0,0)$ $\overrightarrow{OC} = (0,2,0)$ $\overrightarrow{OD} = (2,2,0)$

$\overrightarrow{BB'} = -(\overrightarrow{OB} \cdot \hat{n})\hat{n}$

$= -\frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} (0)(0,-1,1)$

$= 0$

$\therefore \overrightarrow{OB'} = (2,0,0)$

$\overrightarrow{CC'} = -(\overrightarrow{OC} \cdot \hat{n})\hat{n}$

$= -(\overrightarrow{OC} \cdot \hat{n})\hat{n}$

$= -\frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}(0,-1,1)(0-2+0)$

$= -\frac{1}{2}(-2)(0,-1,1)$

$= (0,-1,1)$

$\therefore \overrightarrow{OC'} = (0,2,0) + (0,-1,1)$

$= (0,1,1)$

$\overrightarrow{DD'} = -(\overrightarrow{OD} \cdot \hat{n})\hat{n}$

$= -\frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}(0,-1,1)(0-2+0)$

$= (0,-1,1)$

$\therefore \overrightarrow{OD'} = (2,2,0) + (0,-1,1) = (2,1,1)$