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sandipan\_dey ~

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## 6. Vector decomposition

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Problem Set A due Aug 18, 2021 20:30 IST Completed

#### 2A-8

2.0/2 points (graded)

Find the vectors  $\vec{a}$  and  $\vec{b}$  such that  $\langle 3,1 \rangle = \vec{a} + \vec{b}$  where  $\vec{a}$  is parallel to  $\langle 1,1 \rangle$  and  $\vec{b}$  is perpendicular to  $\langle 1,1 \rangle$ .

$$ec{b}= egin{bmatrix} exttt{[1,-1]} & lacksquare exttt{Answer: [1,-1]} \end{pmatrix}$$

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#### **Solution:**

Note that the unit vector  $\hat{u}$  in the direction of  $\langle 1,1 \rangle$  is  $\langle \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \rangle$ . So to find  $\vec{a}$ , we compute

$$ec{a} = (\langle 3,1 
angle \cdot \hat{u}) \, \hat{u} = rac{4}{\sqrt{2}} \langle rac{1}{\sqrt{2}}, rac{1}{\sqrt{2}} 
angle = \langle 2,2 
angle.$$

Since  $\langle 3,1 
angle = ec{a} + ec{b}$  , we can find  $ec{b}$  by computing

$$ec{b} = \langle 3, 1 
angle - ec{a} = \langle 1, -1 
angle.$$

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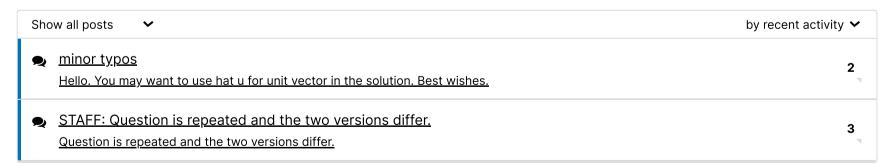
**1** Answers are displayed within the problem

### 6. Vector decomposition

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