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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 $\langle 1, 1 \rangle$.

$\vec{a} =$

✓ Answer: [2,2]

$\vec{b} =$

✓ Answer: [1,-1]

? INPUT HELP

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

$$\vec{a} = (\langle 3, 1 \rangle \cdot \hat{u}) \hat{u} = \frac{4}{\sqrt{2}} \langle \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \rangle = \langle 2, 2 \rangle.$$

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

$$\vec{b} = \langle 3, 1 \rangle - \vec{a} = \langle 1, -1 \rangle.$$

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Answers are displayed within the problem

6. Vector decomposition

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<div><div>STAFF: Question is repeated and the two versions differ.</div><div>Question is repeated and the two versions differ.</div><div>3</div></div>	



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