

DOT PRODUCT AND PROJECTIONS WORKSHEET

APRIL 17, 2019

1. Let T be the triangle formed by the points $A = (1, 1, 8)$, $B = (4, -3, 4)$, and $C = (-3, 1, 5)$. Find the angle $\angle BAC$.

2. Find the direction cosines of the vector $\vec{v} = -\hat{i} + 5\hat{j} + 2\hat{k}$.

3. Let $\vec{v} = 3\hat{i} + 2\hat{k}$ and $\vec{w} = 2\hat{j} + 4\hat{k}$.

(a) Compute $\text{proj}_{\vec{v}}(\vec{w})$.

(b) Express $\vec{w} = \hat{w} + \vec{z}$ where \hat{w} is parallel to \vec{v} and \vec{z} is orthogonal to \vec{v} .

4. A car is towed using a force of 1600 N. The rope used to pull the car forms an angle of 30° with the horizontal. Find the work (in joules) done in towing the car 2000m.