

Show all work. 5 points each.

1) Find the orthogonal projection of \mathbf{b} , i.e., $orth_{\mathbf{a}}\mathbf{b} = \mathbf{b} - proj_{\mathbf{a}}\mathbf{b}$ if $\mathbf{a} = \langle 1, 2 \rangle$ and $\mathbf{b} = \langle -4, 1 \rangle$. Then show this vector is orthogonal to \mathbf{a} .

2) Find the area of the triangle through the points $P(0, 0, 0)$, $Q(1, -1, 2)$, and $R(1, 3, -2)$. Recall the area of the parallelogram formed by two vectors is $A = |\mathbf{a} \times \mathbf{b}|$.