MTH 277, Quiz #1, Spring 2018 Name KEY

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Use $\vec{u} = \langle -4, -1, 5 \rangle, \vec{v} = \langle 3, 10, 1 \rangle$ to find the following.
   a. $\vec{u} + \vec{v}$

$\langle -1, 9, 6 \rangle$

   b. $\|\vec{u}\|$

$\sqrt{16+1+25} = \sqrt{42}$

   c. Write a unit vector in the direction of $\vec{u}$

$\hat{u} = \frac{\vec{u}}{\|\vec{u}\|} = \left\langle \frac{-1}{\sqrt{42}}, \frac{9}{\sqrt{42}}, \frac{6}{\sqrt{46}} \right\rangle$

   d. Find $\vec{u} \cdot \vec{v}$

$-12 - 10 + 5 = -17$

   e. Find the angle between $\vec{u}$ and $\vec{v}$

$\cos^{-1}\left(\frac{-17}{\sqrt{42} \cdot \sqrt{110}}\right) = 1.823588 \text{ radians} = 104.48°$

   f. Find $\vec{u} \times \vec{v}$

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -4 & -1 & 5 \\ 3 & 10 & 1 \end{vmatrix} = (-1-50)\hat{i} - (-4-15)\hat{j} + (-40+3)\hat{k}$$

$$-51\hat{i} + 19\hat{j} - 37\hat{k}$$