MTH 265, Quiz #1, Summer 2021 Name KEY

Instructions: Show all work. Use *exact* answers unless specifically asked to round. You may check your answers in the calculator, but you must show work to receive credit.

1. Find the vector connecting the points $A(-1,0,2)$ and $B(3,1,-1)$. Then find the magnitude of the vector.

$\vec{AB} = \langle 4, 1, -3 \rangle$

$\|\vec{AB}\| = \sqrt{16+1+9} = \sqrt{26}$

2. Find the angle between the vectors $\langle 1,1,1 \rangle$ and $\langle 3,-1,2 \rangle$.

$$\cos\theta = \frac{3-1+2}{\sqrt{3}\sqrt{9+1+4}} = \frac{4}{\sqrt{3}\sqrt{14}} = \frac{4}{\sqrt{42}} \qquad \cos\theta = \frac{4}{\sqrt{42}}$$

$$\theta = \cos^{-1}\left(\frac{4}{\sqrt{42}}\right) \approx 0.9056 \text{ radians} \approx 51.887^\circ$$

3. Find $\vec{u} \times \vec{v}$ if $\vec{u} = \langle 1,-1,3 \rangle$ and $\vec{v} = \langle 2,1,4 \rangle$.

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -1 & 3 \\ 2 & 1 & 4 \end{vmatrix} = (-4-3)\hat{i} - (4-6)\hat{j} + (1+2)\hat{k}$$

$$= -7\hat{i} + 2\hat{j} + 3\hat{k}$$

$$\langle -7, 2, 3 \rangle$$

4. Draw the vector connecting the origin and the point $(4,-1,5)$ in three dimensions. Label your axes using the right-hand rule.