

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 $\langle 3,-1,2 \rangle$.

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

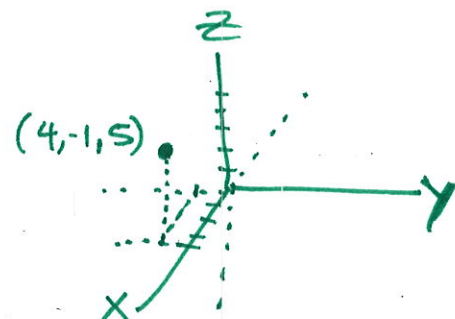
$$\theta \approx .9056 \text{ radians} \quad \text{or} \quad 51.887^\circ$$

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. On the back of this page, draw the point $(4, -1, 5)$ in three dimensions. Label your axes using the right-hand rule.