



Day 5.  
postscript  
about  
 $\sin^{-1}$

In all dimensions,

$$\theta = \cos^{-1} \left( \frac{\vec{u} \cdot \vec{v}}{|\vec{u}| |\vec{v}|} \right).$$

In three dimensional space,

$$\left\{ \begin{array}{l} \theta = \sin^{-1} \left( \frac{|\vec{u} \times \vec{v}|}{|\vec{u}| |\vec{v}|} \right) \quad \text{if } \vec{u} \cdot \vec{v} \geq 0 \\ \theta = \underbrace{\pi}_{180^\circ} - \sin^{-1} \left( \frac{|\vec{u} \times \vec{v}|}{|\vec{u}| |\vec{v}|} \right) \quad \text{if } \vec{u} \cdot \vec{v} \leq 0 \end{array} \right.$$

You probably want to use  $\cos^{-1}$  ...