

14 January 2020

1. Find the measure of the angle between \vec{a} and \vec{b} for each pair of vectors:

(a) $\vec{a} = \begin{pmatrix} 1 \\ 0 \\ 3 \end{pmatrix}, \quad \vec{b} = \begin{pmatrix} 0 \\ 5 \\ 0 \end{pmatrix}$

(b) $\vec{a} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}, \quad \vec{b} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$

(c) $\vec{a} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \quad \vec{b} = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$

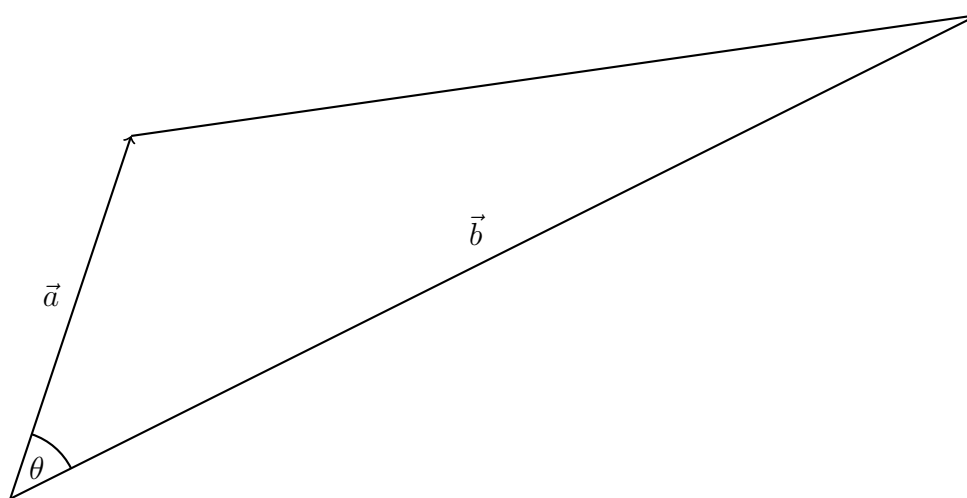
(d) $\vec{a} = \begin{pmatrix} 7 \\ 7 \end{pmatrix}, \quad \vec{b} = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$

Why should knowing the solution to part (c) above make part (d) easy?

2. Let $\vec{a} = \begin{pmatrix} -3 \\ 1 \\ 1 \end{pmatrix}$ and $\vec{b} = \begin{pmatrix} m \\ 1 \\ n \end{pmatrix}$

For a given value of n , there is one value for m that will make $\vec{a} \perp \vec{b}$. Write an equation that gives this value for m in terms of n . (*hint*: start with $\vec{a} \cdot \vec{b} = 0$)

3. Consider the triangle with vertices at $(0,0)$, $(8,4)$, $(1,3)$:



- (a) Write \vec{a} and \vec{b} in column-vector notation:
- (b) Find the magnitude of \vec{a} :
- (c) Find the magnitude of \vec{b} :
- (d) Find the angle θ between \vec{a} and \vec{b} :
- (e) Find the area of the triangle (*hint*: look at IB formula sheet)

4. If we know that all of the following statements are true for some vectors \vec{a} , \vec{b} , \vec{c} , and \vec{d} :

(a) $\vec{a} \parallel \vec{b}$

(b) $\vec{b} \perp \vec{c}$

(c) $\vec{c} = k\vec{d}$ for some $k > 0$

then what must the value of $\vec{a} \cdot \vec{d}$ be?

5. Of the vector concepts covered so far, what topic have you found the most confusing? What do you think would help you understand this concept (more examples, more intuitive explanations, more mathematical derivations, ...)?