

234 Quiz 2

Section:

Name:

15 minutes. There's a bonus problem on back.

1. (5+2) (a). Suppose $\vec{a} = \begin{pmatrix} s \\ 1-s \end{pmatrix}$ and $\vec{b} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$. Find the values of s , so that they make an acute angle. (Hint: $\cos \theta > 0$. Be sure to exclude $\theta = 0$ when $\vec{a} \parallel \vec{b}$.)
(b). For two vectors \vec{a}, \vec{b} , the value of $(\vec{a} \times \vec{b}) \cdot \vec{b}$ is _____. Why?
2. (3) Suppose $A(1, -1, 2)$ and $B(2, 1, 3)$. Parametrize the **line segment** AB . (Hint: In other words, find a vector-valued function $\vec{x}(t)$ so that the curve it traces out as t varies is the line segment. If you like, you can think about a particle moving from A towards B with a constant velocity \overrightarrow{AB} .)

Bonus: For a charged particle with charge q moving in a magnetic field \vec{B} , the Lorentz force acting on it is $\vec{F} = q\vec{v} \times \vec{B}$ where \vec{v} is the velocity vector. Use Newton's law $\vec{F} = m \frac{d}{dt} \vec{v}$ to show that the speed $\|\vec{v}\|$ doesn't change if the Lorentz force is the only force acting on the particle. (2 pts)