

**Quick Quiz!**

Name: *Bethany Little*

I would like to get to know you, and also to figure out where I should start teaching. Please take a few minutes to fill this out. Thanks!

1. Tell me about yourself (eg. where you are from, some interesting fact about you, etc)

*I was born in France, grew up in Morocco then Canada, and now live in the US, so I don't really know where I'm from. :)*

*I like music, art, + swimming, and my bike is my transportation*

2. What is your favorite snack?

*popcorn? (kettle corn)*

3. Tea or coffee (or neither)?

*tea*

4. Why are you taking this class? Anything in particular you are interested in or hope to get out of it?

5. What else are you doing this summer?

*Studying for the physics prelim. exams! ~~A~~*

6. Given two vectors

$$\mathbf{u} = \mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$$

$$\mathbf{v} = \mathbf{j} + 2\mathbf{k}$$

Find:

a)  $\mathbf{u} + \mathbf{v}$

b)  $\mathbf{u} - \mathbf{v}$

c)  $\mathbf{u} \cdot \mathbf{v}$

d)  $\mathbf{u} \times \mathbf{v}$

e)  $\mathbf{v} \times \mathbf{u}$

$$\begin{aligned} \text{a) } \vec{u} + \vec{v} &= (1+0)\hat{i} + (2+1)\hat{j} + (3+2)\hat{k} \\ &= \hat{i} + 3\hat{j} + 5\hat{k} \end{aligned}$$

$$\begin{aligned} \text{b) } \vec{u} - \vec{v} &= (1-0)\hat{i} + (2-1)\hat{j} + (3-2)\hat{k} \\ &= \hat{i} + \hat{j} + \hat{k} \end{aligned}$$

$$\text{c) } \vec{u} \cdot \vec{v} = (1)(0) + (2)(1) + (3)(2) = 8$$

$$\begin{aligned} \text{d) } \vec{u} \times \vec{v} &= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 2 & 3 \\ 0 & 1 & 2 \end{vmatrix} = \hat{i} \begin{vmatrix} 2 & 3 \\ 1 & 2 \end{vmatrix} + \hat{j} \begin{vmatrix} 1 & 3 \\ 0 & 2 \end{vmatrix} + \hat{k} \begin{vmatrix} 1 & 2 \\ 0 & 1 \end{vmatrix} \\ &= \hat{i} + 2\hat{j} + \hat{k} \end{aligned}$$

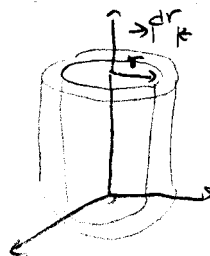
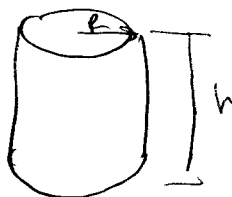
$$\text{e) } \vec{v} \times \vec{u} = -(\vec{u} \times \vec{v}) = -\hat{i} - 2\hat{j} - \hat{k}$$

7. Given a cylinder of radius  $R$  and height  $h$ :

a) Find its volume.

b) Find its surface area.

c) if its density is given by  $\rho = 2r^2 \text{ kg/m}^3$ , where  $r$  is the distance from the center of the cylinder, find its volume <sub>mass</sub>.



$$dV = 2\pi r h dr$$

$$\rho(r) = 2r^2$$

a)  $V = \pi R^2 h$

b)  $S = 2\pi R h + 2\pi R^2$

c)  $M = \int dM$

$$= \int \rho dV$$

$$= \int \rho 2\pi r h dr$$

$$= 2\pi h (2) \int_0^R r^3 dr$$

$$M = \pi h R^4$$