

Reading Assignment 2 (Due Friday 8/1 by 5PM)

Directions: Read the following sections of the book:

- Review [Section 9.2.3](#), [Section 9.2.4](#), [Section 9.2.5](#), and [Section 9.2.6](#) if necessary (we covered the main ideas during class).
- [Section 9.3.1](#)
- [Section 9.3.2](#)
- The first paragraph of [Section 9.4](#). You can read further if desired.

and complete the following tasks along the way. If an Activity is not listed, you do not need to complete it (although you are welcome to read it). Turn your write up in via [gradescope](#). You do not need to write the questions down, as long as you clearly indicate the question number.

1. Complete [Preview Activity 9.3.1](#).
2. Complete [Activity 9.3.2](#).
3. [Click here](#) to view the vectors from Activity 9.3.2.a using GeoGebra. Use [Equation 9.3.1](#) to compute the angle (in radians) between them.
4. [Click here](#) to open a GeoGebra applet. Read the instructions and play around with the app for a few minutes. Do you notice anything (or several things) that seem interesting? Do you notice any patterns? Describe your observations.
5. After reading Section 9.3.1 and 9.3.2, write down three things that you learned or that you still have questions about.
6. Complete [Preview Activity 9.4.1](#)

Basic learning objectives: These are the things you should be able to perform with reasonable fluency **when you arrive at our next class meeting**. Important new vocabulary words are indicated in italics.

1. Compute the *dot product* of two vectors.
2. Describe the algebraic relation between the dot product $\mathbf{u} \cdot \mathbf{u}$ of a vector $\mathbf{u}$ with itself and the magnitude $|\mathbf{u}|$ of the vector.
3. Describe the algebraic relation between the dot product $\mathbf{u} \cdot \mathbf{v}$ of two vectors $\mathbf{u}$ and $\mathbf{v}$ and the *angle between them*.
4. Compute the *cross product* of any pair of the standard unit vectors i, j, k using the right-hand rule.
5. Use properties of the cross product to compute cross products of linear combinations of standard unit vectors.

Advanced learning objectives: In addition to mastering the basic objectives, here are the things you should be able to perform **after class, with sufficient practice**:

1. Utilize the properties of the dot product to perform more advanced computations.

2. Determine when two vectors are perpendicular and when the angle between them is acute or obtuse.
3. Represent a force using a vector and calculate the work required to displace an object using that force.
4. Use the dot product to compute the projection $\text{proj}_{\mathbf{v}}\mathbf{u}$ of $\mathbf{u}$ onto $\mathbf{v}$ and identify this vector geometrically.
5. Compute cross products using determinants.
6. State a *geometric* definition of the cross product $\mathbf{u} \times \mathbf{v}$ by specifying its magnitude and direction (relative to $\mathbf{u}$ and $\mathbf{v}$). Compute the magnitude of the cross product algebraically.
7. Utilize vectors, the dot product, and the cross product to compute areas of triangles and parallelograms, and volumes of tetrahedrons and parallelepipeds. Understand why the cross product is related to areas and volumes. Describe various similarities and differences between the dot product and cross product.