

Chapter 6:

1. Determine magnitude given: vector equation or scalar component.
Determine unit vector.

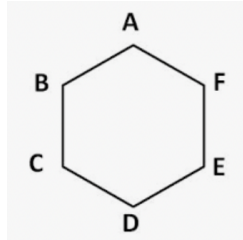
$$\vec{a} = \vec{i} + 2\vec{j} - 3\vec{k}, \vec{b} = -\vec{i} + 2\vec{k}, \text{ and } \vec{c} = 2\vec{j} - \vec{k}$$

Find the **magnitude and unit vector** of $\vec{v} = \vec{a} - 2\vec{b} + 3\vec{c}$.

2. Geometric vector addition and subtraction.

a) Given $\|\vec{a}\| = 9$, $\|\vec{b}\| = 14$, and $\|\vec{a} + \vec{b}\| = 18$, find $\|\vec{a} - \vec{b}\|$ and the angle between $\vec{a} - \vec{b}$ and \vec{b}

b) If $\overrightarrow{AB} = \vec{u}$ and $\overrightarrow{BC} = \vec{v}$, express \overrightarrow{AF} in terms of \vec{u} and \vec{v} .



3. Collinearity and linear dependency.

- a) Are the three vectors $\vec{a} = (2, 1, 3)$, $\vec{b} = (1, 3, 2)$ and $\vec{c} = (-6, 6, -1)$ possible to span a plane?
- b) If A, B, C are colinear, find the missing values.
- A (1, 2, 3)
- B (2, m, - 6)
- C (-1, -4, n)

Chapter 7:

4. True bearing, quadrant bearing, polar coordinate, vector equation, scalar component.

5. Dot product

The vector $2\vec{a} + 3\vec{b}$ and $\vec{a} - \vec{b}$ are perpendicular. If $|\vec{a}| = 4|\vec{b}|$, then determine the angle between \vec{a} and \vec{b} . Round the angle to nearest tenth.

6. Scalar and vector projection.

- a) $\vec{a} = \vec{i} + 2\vec{j} - 3\vec{k}$, $\vec{b} = -\vec{i} + 2\vec{k}$, and $\vec{c} = 2\vec{j} - \vec{k}$. Find $V Proj(\vec{c} \text{ onto } \vec{a} + \vec{b})$.
- b) Find angles of \vec{b} with each axis.

7. Velocity

If an airplane wants to go to a place that is 500km [N60E] with a resultant ground speed of 210km/h and wind is 20km/h blowing eastward, what is the actual velocity of the airplane?

8. Force pg359

A mass of 20 kg is suspended from a ceiling by two lengths of rope that make angles of 60° and 45° with the ceiling. Determine the tension in each of the ropes.

9. Cross product

- a) The shape ABCD is parallelogram where A (3, 2, 1), B (1, 2, 1), and C (-2, 3, 8), find one pair of possible coordinates of vertex D.
- b) Find cross product between two diagonal
- c) Find the area of the parallelogram

10. Work and Torque

- a) What is the work done if displacement is $\vec{d} = (1, 3, 2)$ and the force is $\vec{F} = (-6, 6, -1)$?
- b) If a door is initially closed, how much torque will be done to open the door if the force $\vec{F} = (-6, 6, -1)$ is applied, with given the distance between the door knob and the door hinge is 1.2 meters?