

HW MATH227/6

1. Let $\mathbf{u} = (-3, 1, 2)$, $\mathbf{v} = (4, 0, -8)$, and $\mathbf{w} = (6, -1, -4)$. Find the components of

- (a) $\mathbf{v} - \mathbf{w}$
- (b) $6\mathbf{u} + 2\mathbf{v}$
- (c) $-\mathbf{v} + \mathbf{u}$

2. Find the norm of \mathbf{v}

- (a) $\mathbf{v} = (4, -3)$
- (b) $\mathbf{v} = (2, 2, 2)$
- (c) $\mathbf{v} = (-7, 2, -1)$

3. Find $\mathbf{u} \cdot \mathbf{v}$ and determine the angle θ between \mathbf{u} and \mathbf{v} .

- (a) $\mathbf{u} = (6, 1, 4)$, $\mathbf{v} = (2, 0, -3)$
- (b) $\mathbf{u} = (2, -1, -1)$, $\mathbf{v} = (-1, -1, 2)$

4. Find a point-normal form.

(a) $-3x + 7y + 2z = 10$

(b) $x - 4z = 0$

5. Find parametric equations for the line of intersection of the planes

(a) $-3x + 2y + z = -5$ and $7x + 3y - 2z = -2$

(b) $5x - 7y + 2z = 0$ and $y = 0$

6. For which values of k are \mathbf{u} and \mathbf{v} orthogonal?

(a) $\mathbf{u} = (2, 1, 3)$, $\mathbf{v} = (1, 7, k)$

(b) $\mathbf{u} = (k, k, 1)$, $\mathbf{v} = (k, 5, 6)$

7. Solve the following linear system of equations for x_1 , x_2 , and x_3 .

$$\begin{array}{rcl} (1, -1, 4) \cdot (x_1, x_2, x_3) & = & 10 \\ (3, 2, 0) \cdot (x_1, x_2, x_3) & = & 1 \\ (4, -5, -1) \cdot (x_1, x_2, x_3) & = & 7 \end{array}$$