**Soal untuk Tutorial 5 Aljali SI dan IF TA 2022/2023**

1. Evaluate the given expression with u = (−2,−1,4,5), v = (3,1,−5,7), and w = (−6,2,1,1).

(a) $\|\mathbf{u}\| + \|-2\mathbf{v}\| + \|-3\mathbf{w}\|$ (b) $\big\|\|\mathbf{u}-\mathbf{v}\|\mathbf{w}\big\|$

2. Let v = (−2, 3, 0, 6). Find all scalars k such that ||kv|| = 5.

3. . Let v = (1, 1, 2, −3, 1). Find all scalars k such that ||kv|| = 4.

4. Find u · v, u · u, and v · v

(a) $\mathbf{u} = (1, 1, -2, 3),\ \mathbf{v} = (-1, 0, 5, 1)$

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

5. Determine whether the expression makes sense mathematically. If not, explain why.

(a) $\|\mathbf{u}\| \cdot \|\mathbf{v}\|$ (b) $(\mathbf{u} \cdot \mathbf{v}) - \mathbf{w}$

(c) $(\mathbf{u} \cdot \mathbf{v}) - k$ (d) $k \cdot \mathbf{u}$

6.

Let $\mathbf{r}_0 = (x_0, y_0)$ be a fixed vector in $R^2$. In each part, describe in words the set of all vectors $\mathbf{r} = (x, y)$ that satisfy the stated condition.

(a) $\|\mathbf{r} - \mathbf{r}_0\| = 1$ (b) $\|\mathbf{r} - \mathbf{r}_0\| \leq 1$ (c) $\|\mathbf{r} - \mathbf{r}_0\| > 1$

7.

Show that two nonzero vectors $\mathbf{v}_1$ and $\mathbf{v}_2$ in $R^3$ are orthogonal if and only if their direction cosines satisfy

$$\cos\alpha_1 \cos\alpha_2 + \cos\beta_1 \cos\beta_2 + \cos\gamma_1 \cos\gamma_2 = 0$$

8.

What can you say about two nonzero vectors, $\mathbf{u}$ and $\mathbf{v}$, that satisfy the equation $\|\mathbf{u} + \mathbf{v}\| = \|\mathbf{u}\| + \|\mathbf{v}\|$?

9. Determine whether u and v are orthogonal vectors.

(a) $\mathbf{u} = (2, 3),\ \mathbf{v} = (5, -7)$

(b) $\mathbf{u} = (1, 1, 1),\ \mathbf{v} = (0, 0, 0)$

(c) $\mathbf{u} = (1, -5, 4),\ \mathbf{v} = (3, 3, 3)$

(d) $\mathbf{u} = (4, 1, -2, 5),\ \mathbf{v} = (-1, 5, 3, 1)$

10. Find a point-normal form of the equation of the plane passing through P and having n as a normal.

a. P (2, 0, 0); n = (0, 0, 2)

b. P (0, 0, 0); n = (1, 2, 3)