

ITM426, Long Quiz 1, 2025 Fall

- ITM 426 Engineering Mathematics 25F
- Duration: 60 minutes
- Weights: 10%
- 2 Questions

- Name: _____
- Student ID: _____
- E-mail: _____@seoultech.ac.kr

- Write legibly.
- Justification is necessary unless stated otherwise.
- Partial points are given only sparingly for the most problems because you are expected to 1) carry out proper sanity check and 2) correct your mistake by doing so.

#1. Let $\mathbf{y} = (2, 4)$ and $\mathbf{u} = (6, 2)$.

a) Compute the vector \mathbf{z} such that

$$\mathbf{z} = \frac{\mathbf{y} \cdot \mathbf{u}}{\mathbf{u} \cdot \mathbf{u}} \mathbf{u},$$

where \cdot is the dot-product operator. [2.5pt]

b) Draw the vector \mathbf{y} , \mathbf{u} , and \mathbf{z} in a two-dimensional space as precisely as possible. [2.5pt]

#2. We have a matrix $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$. Let us call each column vector of matrix A as $\mathbf{v}_1, \mathbf{v}_2$, and \mathbf{v}_3 . Prove that the set of these three vectors span a 3-dimensional vector space. [5pt]