응용선형대수 **2022-2학기 수학과 졸업시험**

2022 Fall | APPLIED LINEAR ALGEBRA | Graduation Exam

Let

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & -1 \\ 1 & 1 & 1 \end{bmatrix}.$$

1. **(10 points)** Find an orthonormal basis of the row space, $R(A)$.

2. **(10 points)** Find the projection matrix from $\mathbb{R}^3$ onto $R(A)$.

3. **(10 points)** Let $T : \mathbb{R}^3 \to \mathbb{R}^3$ be the linear transformation defined by $T(x) = Ax$. Find the vector in $R(A)$ which is mapped to the first column of A under T.