

Quiz-2: Pick the question as per the last digit of your ID Number and answer **Question** 0-9 as per the last digit of your ID

Question 1: Subspace of \mathbb{R}^2 Let $V = \mathbb{R}^2$ and consider the set

$$S = \left\{ \begin{pmatrix} x \\ y \end{pmatrix} \in \mathbb{R}^2 : x = 0 \right\}.$$

- a) Prove that S is a subspace of \mathbb{R}^2 . b) Find a basis for S . c) Determine the dimension of S .
Question 2: Subspace of \mathbb{R}^3 Let $V = \mathbb{R}^3$ and consider the set

$$S = \left\{ \begin{pmatrix} x \\ y \\ z \end{pmatrix} \in \mathbb{R}^3 : y = 0 \right\}.$$

- a) Prove that S is a subspace of \mathbb{R}^3 . b) Find a basis for S . c) Determine the dimension of S .
Question 3: Subspace of \mathbb{R}^2 Let $V = \mathbb{R}^2$ and consider the set

$$S = \left\{ \begin{pmatrix} x \\ y \end{pmatrix} \in \mathbb{R}^2 : x + y = 0 \right\}.$$

- a) Prove that S is a subspace of \mathbb{R}^2 . b) Find a basis for S . c) Determine the dimension of S .

Question 4: Subspace of Polynomials Let $P_2(\mathbb{R})$ be the vector space of all polynomials of degree at most 2 with real coefficients. Consider the set

$$S = \{p(x) \in P_2(\mathbb{R}) : p(0) = 0\}.$$

- a) Prove that S is a subspace of $P_2(\mathbb{R})$. b) Find a basis for S . c) Determine the dimension of S .

Question 5: Subspace of Matrices Let $M_{2 \times 2}(\mathbb{R})$ be the vector space of all 2×2 matrices with real entries. Consider the set

$$S = \left\{ \begin{pmatrix} a & b \\ 0 & d \end{pmatrix} : a, b, d \in \mathbb{R} \right\}.$$

- a) Prove that S is a subspace of $M_{2 \times 2}(\mathbb{R})$. b) Find a basis for S . c) Determine the dimension of S .

Question 6: Subspace of \mathbb{R}^3 Let $V = \mathbb{R}^3$ and consider the set

$$S = \left\{ \begin{pmatrix} x \\ y \\ z \end{pmatrix} \in \mathbb{R}^3 : x = y = 0 \right\}.$$

- a) Prove that S is a subspace of \mathbb{R}^3 . b) Find a basis for S . c) Determine the dimension of S .

Question 7: Subspace of \mathbb{R}^2 Let $V = \mathbb{R}^2$ and consider the set

$$S = \left\{ \begin{pmatrix} x \\ y \end{pmatrix} \in \mathbb{R}^2 : x = 2y \right\}.$$

a) Prove that S is a subspace of \mathbb{R}^2 . b) Find a basis for S . c) Determine the dimension of S .

Question 8: Subspace of \mathbb{R}^4 Let $V = \mathbb{R}^4$ and consider the set

$$S = \left\{ \begin{pmatrix} x \\ y \\ z \\ w \end{pmatrix} \in \mathbb{R}^4 : x = 0 \right\}.$$

a) Prove that S is a subspace of \mathbb{R}^4 . b) Find a basis for S . c) Determine the dimension of S .

Question 9: Subspace of \mathbb{R}^3 Let $V = \mathbb{R}^3$ and consider the set

$$S = \left\{ \begin{pmatrix} x \\ y \\ z \end{pmatrix} \in \mathbb{R}^3 : x + 2y + 3z = 0 \right\}.$$

a) Prove that S is a subspace of \mathbb{R}^3 . b) Find a basis for S . c) Determine the dimension of S .

Question 0: Subspace of \mathbb{R}^3 Let $V = \mathbb{R}^3$ and consider the set

$$S = \left\{ \begin{pmatrix} x \\ y \\ z \end{pmatrix} \in \mathbb{R}^3 : x = y = z \right\}.$$

a) Prove that S is a subspace of \mathbb{R}^3 . b) Find a basis for S . c) Determine the dimension of S .