

QUIZ 9

Time: 10min

1. Find a basis for the set of vectors in R^3 in the plane $x + 2y + z = 0$ (Hint: think of the equation as a system of homogenous equations).
2. Suppose $R^5 = \text{Span}\{v_1, \dots, v_5\}$. Explain why $\{v_1, \dots, v_5\}$ is a basis for R^5 .

Hints: follow these steps (each step is worth 2 points):

- (i) What is the definition of basis?
- (ii) What property should the set $\{v_1, \dots, v_5\}$ have in order to be a basis for R^5 ?
- (iii) Let A be a matrix with $\{v_1, \dots, v_5\}$ as columns, and consider the system $Ax = b$ where b is a vector in R^5 . Why is this system consistent for all b in R^5 ?
- (iv) If the above system is always consistent, then what can we conclude about the columns of A ? Why?

Problem 1 is worth 7 points and Problem 2 is worth 8 points.