Q5) Given $Ax = b$.

$A \in \mathbb{R}^{n \times n}$

$b \in \mathbb{R}^n$.

A is orthogonal.

Matrix A is a square orthogonal matrix which implies that colouns of A are linearly independent, because we have n linearly independent colouns (vectors) in R^n, they form the basis of R^n.

$b \in$ colspace (A) always.

The equation always has a solution.

A is also invertible.

$A A^T = I$ (Because A is orthogonal)

$A^T = A^{-1}$

$x = A^{-1} b$

$$\boxed{x = A^T b}$$

We get this advantage from A being orthogonal. Apart from guarantee of finding a solution we do not have to do computation of the inverse of A. Inverse can directly be calculated by ~~calt~~ transpose of the matrix.