

$$y = ax + b$$

$$\begin{bmatrix} -1 \\ 0.2 \\ 0.9 \\ 2.1 \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \\ 2 \\ 3 \end{bmatrix} a + \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} b$$

Linear Algebra

$$= \begin{bmatrix} 0 & 1 \\ 1 & 1 \\ 2 & 1 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix}$$

a, b

$$b = Ax \rightarrow \hat{x}$$

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

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Summary So Far

- Least squares
 - Derivation of normal equation
 - Case of non-invertible $A^T A$
- Orthogonal and orthonormal vectors
- Orthogonal and orthonormal basis of a subspace
- Orthogonal projections
- Gram-Schmidt orthogonalization and QR factorization