**Homework 3 Machine Learning**

1. **Biến đổi lại linear regression trên lớp ra latex, từ t = y(x,w) + noise -> w = (X^TX)-1X^Tt**

=>

*Supppose:*

*We have:*

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1. **Chứng minh invertible khi X full rank.**

The condition that X is a full rank matrix is not enough. It needs to have full row rank, i.e. it needs to have linearly independent rows.

For example, the matrix M = has full rank, but is not invertible. The reason is that M does not have full row rank, but full column rank.

Assuming X has full row rank, then yes, will be invertible. The proof is the following.

Suppose =0 . Then, of course, =0 too.

Conversely, suppose =0 . Then =0 , so that ()=0 . This implies =0 .

Hence, we have proved that =0 if and only if v is in the nullspace of . But =0 and v≠0 if and only if X has linearly dependent rows. Thus, has nullspace {0} (i.e. is invertible) if and only if X has linearly independent rows.