EECS 16B
Designing Information Devices and Systems II

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Announcements

- MT 2: Monday 7-9pm
  - covers last week's lectures through Gram-Schmidt and Spectral Theorem
  - does not cover minimum energy control, SVD, and later
- student support meetings
  - see Ed post

Today

- review
- Singular Value Decomposition (SVD)

Suppose A and is a rectangular matrix, and D is square and diagonal.

Assuming the dimensions of A and D allow for the below matrix multiplications, which of the following will result in a symmetric matrix?

1. AA^T
2. A^TAA^TA
3. ADA
4. all of the above
5. 1 and 2 only

$$A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \\ 3 & 6 \end{bmatrix}$$

What is the column rank of A?

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What is the row rank of A?

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What is the column rank of A?

What is the row rank of A?

Can the column rank of a matrix ever be different from its row rank?

Suppose A is a matrix with *m* rows and *n* columns.

Which of the following must be true?

1. the rank of A is the greater of *m* and *n*
2. the rank of A is the lesser of *m* and *n*
3. the rank of A is at most the greater of *m* and *n*
4. the rank of A is at most the lesser of *m* and *n*
5. none of the above

Suppose A is a matrix with *m* rows and *n* columns, and was generated by adding together two rank 1 matrices.

Which of the following must be true?

1. the rank of A is 2
2. the rank of A is 1 or 2
3. the rank of A is 0, 1, or 2
4. the rank of A could be anything up to the lesser of *m* and *n*