

## Problems for Lecture 8

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1.

Suppose  $v = [v_1, v_2, \dots, v_n]^T$ ,

$$\|v\|_2^2 = v_1^2 + v_2^2 + \dots + v_n^2 \leq \|v\|_\infty (|v_1| + |v_2| + \dots + |v_n|) = \|v\|_1 \|v\|_\infty$$

7.

$$|(AB)_{ij}|^2 = \left( \sum_{k=1}^p a_{ik} b_{kj} \right)^2 \leq \left( \sum_{k=1}^p a_{ik}^2 \right) \left( \sum_{k=1}^p b_{kj}^2 \right)$$

Hence, sum the  $i, j$

$$\|AB\|_F^2 \leq \|A\|_F^2 \|B\|_F^2$$

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