MATH 307

Individual Homework 7

Instructions: Read textbook pages 37 to 38 and 43 to 45 before working on the homework problems. Show all steps to get full credits.

Use Cauchy Schwartz inequality to prove the following inequalities. HInt: use the default inner product in $\mathbb{R}^n$ and $\mathbb{R}^{m\times n}$ which are defined as $< u, v >= \sum_i u_i v_i$ and $< A, B >$ = $\sum_i \sum_j a_{ij} b_{ij}$ respectively.

1. Prove that $\sum_i |x_i| \leq \sqrt{n}\sqrt{\sum_i |x_i|^2}$, for all $x \in \mathbb{C}^n$.
2. Prove that $\sum_i \sum_j |a_{ij}|^2 |b_{ij}|^3 \leq \sqrt{\sum_i \sum_j |a_{ij}|^4}\sqrt{\sum_i \sum_j |b_{ij}|^6}$, for all $A, B \in \mathbb{C}^{m\times n}$.