MATH 307

Individual Homework 9

Instructions: Read textbook pages 46 to 51 before working on the homework problems. Show all steps to get full credits.

1. Write down the default inner product in $\mathbb{C}^3$ and show that the induced norm corresponding to this default inner product is actually the 2-norm. Let

$$u = \begin{pmatrix} 1+i \\ 2i \\ 3+i \end{pmatrix}, v = \begin{pmatrix} 1 \\ 3-i \\ -i \end{pmatrix},$$

   find the norm of u and the distance between u, v under the default inner product in $\mathbb{C}^3$.

2. Find the $1-, 2-, \infty-$ norm unit balls in $\mathbb{R}^2$ and sketch them. Find all the $x \in \mathbb{R}^2$ that satisfies $\|x\|_1 = \|x\|_2 = \|x\|_\infty = 1$.