

## MATH 347 Homework #

Due 3/7/08

Note Title

#1  $\frac{1+i}{3+i} = a+ib$  for some  $a, b \in \mathbb{R}$ .

What are they?

#2 Prove that for any  $z, w \in \mathbb{C}$   
 $\overline{z+w} = \bar{z} + \bar{w}$ .

#3 Prove that for any  $z, w \in \mathbb{C}$ ,  $|zw| = |z||w|$ .  
Hint  $|zw|^2 = zw \cdot \overline{zw}$  ....

#4 Prove that for any  $z_1, \dots, z_n \in \mathbb{C}$   
 $|z_1 + \dots + z_n| \leq |z_1| + |z_2| + \dots + |z_n|$

Hint Induction on  $n$ .

#5 Find 5 distinct complex numbers which are 5<sup>th</sup> roots of 1. That is, find  $z_1, z_2, \dots, z_5$ ,  $z_i \neq z_j$  for  $i \neq j$ , so that  $z_j^5 = 1$ .

Hint: look for  $z$ 's of the form  $e^{ix}$ ,  $x \in \mathbb{R}$ .