MATLAB: University of California, Davis

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MATH 22AL LAB # 10

4 Basics of complex numbers

4.1 Introduction

Consider the following questions:

1. Find all numbers x, such that $x^2 - 4 = 0$.

type	`P1= [ 1 0 -4]`	
type	`S1 = roots(P1)`	

2. Find all numbers x, such that $x^2 + 1 = 0$.

type	`P1= [ 1 0 1]`	
type	`S1 = roots(P1)`	

Real numbers 2, and -2 will satisfy the first equation, but there is no real number such that $x^2 + 1 = 0$. We need a new number (it is called imaginary number) say i whose square is -1. So, we write $i = \sqrt{-1}$.

4.1.1 History:

The Italian mathematician Gerolamo Cardano (1501-1576) encountered complex numbers during his attempts to find solutions to cubic equations. Cardano called them "fictitious" numbers. You may find more info about history of development of complex numbers. A short history of Complex numbers can be found at " http://www.math.uri.edu/∼merino/spring06/mth562/ShortHistoryComplexNumbers2006.pdf"

We want to be able to add this number $i = \sqrt{-1}$ to an other real number say 3, the result will be shown as $3 + i$. Or we might want to multiply i with 5 then add the result to 3 to get $3 + 5i$.

In general every number of the form $a + ib$ is called a complex number. Real numbers can be put in a one-to-one correspondence with the points on the x-axis. We can think of the correspondence of the complex numbers with the points on the xy-plane.