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## CALCULUS WITH COMPLEX NUMBERS

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A complex number can be represented by an expression of the form  $z = a + bi$ , where  $a$  and  $b$  are real numbers and  $i$  is a symbol with the property that  $i^2 = -1$ . The complex numbers can be added, subtracted, multiplied, and divided like real numbers and have other elegant properties. For example, real numbers alone do not provide a solution for every polynomial algebraic equation with real coefficients, while complex numbers do (this is the fundamental theorem of algebra).

## 2 The Calculus of Complex Functions

Section 7.2 if and only if  $\lim_{n \rightarrow \infty} x_n = a$  and  $\lim_{n \rightarrow \infty} y_n = b$ . Thus to determine the limiting behavior of a sequence  $\{z_n\}$  of complex numbers, we, Traditionally the letters  $z$  and  $w$  are used to stand for complex numbers. Since any complex number is specified by two real numbers one can visualize them by plotting a point with coordinates  $(a, b)$  in the plane for a complex number  $a + bi$ . The plane in which one plots these complex numbers is called the

Complex plane, or Argand plane.  $z = a + bi$   $a =$

$\text{Re}(z)$   $b = \text{Im}(z)$   $r = |z| = \sqrt{a^2 + b^2}$

Figure 1., Complex Numbers MATH 160,

Precalculus J. Robert Buchanan Department

of Mathematics Fall 2011 J. Robert

Buchanan Complex Numbers, 2 Use the

imaginary unit  $i$  to write complex numbers.

Add, subtract, and multiply complex

numbers. Use complex conjugates to

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imaginary number. Please rotate your phone

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represent complex numbers graphically by

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