

Honors Calculus, Math 1450- Assignment 7 (due Tuesday November 15)

Dr Matthew Nicol, PGH 665

Q1 Find the absolute value and argument of the following complex numbers:

- $3 + 4i$
- $(3 + 4i)^{-1}$
- $(1 - i)^5$
- $2 + 3i$

Q2 Solve the following polynomial equations and find complex roots.

- $x^2 + 4 = 0$
- $x^2 + x + 1 = 0$
- $x^4 + x^2 + 1 = 0$

Q3 Describe the set of complex numbers such that

- $\bar{z} = -z$
- $|z| < 1$
- $|z - (1 + i)| < 4$

Q4 Show that the real part of z is $(z + \bar{z})/2$ and the imaginary part of z is $(z - \bar{z})/(2i)$.

Q4 An n th root of unity is a complex number z satisfying $z^n = 1$. Find all cube roots of unity, i.e. all complex numbers z satisfying $z^3 = 1$ (there are 3 of them).

Q5 Suppose that z is an n th root of 1 and $z \neq 1$. Show that $1 + z + z^2 + \cdots + z^{n-1} = 0$.
Hint show $(z - 1)(1 + z + z^2 + \cdots + z^{n-1}) = 0$.