# Honors Calculus, Math 1450- Assignment 7 (due Tuesday November 24)

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**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 nth 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 nth root of 1 and $z\neq 1$. Show that $1+z+z^2+\cdots+z^{n-1}=0$. *Hint show* $(z-1)(1+z+z^2+\cdots+z^{n-1})=0$.