

Recitation 5, February 23, 2006

Complex numbers, complex exponentials

1. Mark the points $e^{\pi i/3}$ and $e^{\ln 2 + \pi i/4}$ complex plane and find their expressions in the form $a + bi$.
2. Express the fourth roots of -1 in the form $a + bi$.
3. Find the general solution of $\dot{x} + 2x = e^t$.
4. Solve $\dot{x} + 2x = \cos(2t)$ by replacing it with a complex valued equation, solving that, and then extracting the real part.
5. Write each of the following functions $f(t)$ in the form $A \cos(\omega t - \phi)$. In each case, begin by drawing a right triangle with sides a and b .
(a) $\cos(2t) + \sin(2t)$.
(b) $\cos(\pi t) - \sqrt{3} \sin(\pi t)$. (c) $\operatorname{Im} \frac{e^{it}}{2 + 2i}$.