**Homework:**

1. Use De Moivre's formula to find a trig identity for $\cos(3\theta)$.

2. Find all roots of
   
   \begin{align*}
   a) & \ (-2+2i)^{\frac{1}{3}} \\
   b) & \ (-1)^{\frac{1}{5}} \\
   c) & \ 8^{\frac{1}{6}} \\
   d) & \ (16i)^{\frac{1}{4}}
   \end{align*}

3. Let $z$ be a non-zero complex number and $n$ an integer.
   
   Show that $\ z^n + (\overline{z})^n $ is a real number.

4. Find all four roots of $z^4 + 4 = 0$ and prove that
   
   $z^4 + 4$ factors into 2 quadratics with real coefficients.