

## Complex Numbers 2

1. Evaluate  $\left(\frac{\sqrt{3}+i}{2}\right)^3$  using the binomial theorem.
2. Expand  $(\cos \theta + i \sin \theta)^4$  using the binomial theorem.  
Hence express  $\cos 4\theta$  as a polynomial in  $\cos \theta$ .
3. Find the fourth roots of  $-81i$ , and illustrate them on an Argand diagram.
4. By writing  $z$  in the form  $z = x + iy$ :
  - a) Solve the equation  $z^2 = |z|^2 - 4$ ;
  - b) Find the solutions to the equation  $z^2 = i(|z|^2 - 4)$ .
5. Interpret geometrically in the complex plane the equation  $|z-2| = |z-6|$ , showing your answer on an Argand diagram.