Outcome 3 HOMEWORK

1. Solve $z^2 + 2z + 5 = 0$ and represent the solutions on an Argand diagram.

2. Find the square roots of $7 - 24i$.

3. Verify that $z = 1 + i$ is a root of the equation

   $$z^4 + 3z^2 - 6z + 10$$

   and find the other roots.

4. Interpret geometrically in the complex place the equation $|z + 3i| = |z - 1|$.

5. Expand $(\cos\theta + i\sin\theta)^4$ using the binomial theorem and using deMoivre's theorem.

   Use your expansions to express $\cos 4\theta$ as a polynomial in $\cos\theta$.

6. Evaluate $\left(\frac{\sqrt{3}+i}{2}\right)^3$.

7. Find the 6^{th} roots of unity and mark the corresponding points on an Argand diagram.

8. Find the 4^{th} roots of $-81i$, leaving your answers in polar form.

9. Show that the roots of the equation $z^3 + 1$ are represented on an Argand diagram as the vertices of an equilateral triangle.

10. a) If $z = \cos\theta + i\sin\theta$, find in terms of θ

    i) $z - z^{-1}$

    ii) $z^n - z^{-n}$.

    b) Hence, using the binomial theorem, express $\sin^5\theta$ in terms of sines of multiples of θ.