

Complex Number 1

1. Given that $\sqrt{z} = \frac{2}{1-i} + 1 - 2i$, express the complex number z in the form $x + yi$.
2. Calculate, in the form $a + ib$, where $a, b \in \mathbb{R}$, the square root of $16 - 30i$.
3. Express the complex number $z = \sqrt{3} - i$ in its polar form. Hence, find $z^6 + \frac{1}{z^6}$ and $z^6 - \frac{1}{z^6}$.
4. If $z = 1 + 2i$ is a root of the equation $z^4 - z^3 + 4z^2 + 3z + 5 = 0$, express $z^4 - z^3 + 4z^2 + 3z + 5$ as a product of two quadratic factors. Hence, find the complex roots of the equation $z^4 - z^3 + 4z^2 + 3z + 5 = 0$.
5. Solve the equation $z^5 + 32 = 0$.