

1. Calculate $(2 + 3i)(4 - 5i) + (2 - 3i)(4 + 5i)$.
2. Find real numbers x and y such that $(1 - 2i)x + (1 + 2i)y = 1 + i$.
3. Find a complex number z such that $(2 + 3i)z = 4 + 5i$.
4. Prove that $(2 - i\sqrt{11})^7 + (2 + i\sqrt{11})^7$ is a real number.
5. Evaluate $\left(\frac{1+i}{1-i}\right)^{16} + \left(\frac{1+i}{1-i}\right)^8$
6. Show on a picture the set of points which correspond to the complex numbers z satisfying the following system of inequalities:
$$\begin{cases} |z + 1 + i| < 3 \\ 0 < \arg z < \frac{\pi}{3} \end{cases}$$