

Test problems about complex numbers

1. Find absolute values and arguments of the following complex numbers:

1) $z = -3$; 2) $z = 1 + i^{129}$; 3) $z = -\cos\frac{\pi}{7} + i\sin\frac{\pi}{7}$; 4) $z = \frac{1-i}{1+i}$; 5) $z = (-4+3i)^8$

2. Give geometric description of the sets of points in \mathbb{C} which satisfy the inequalities:

1) $\operatorname{Re} z > 0$; 2) $\operatorname{Im} z \leq 1$; 3) $|\operatorname{Im} z| < 1$; 4) $|z| < 1$; 5) $|z-i| \geq 1$;

6) $1 < |z-1| < 2$; 7) $0 < \arg z < \frac{\pi}{4}$; 8) $|\pi - \arg z| < \frac{\pi}{4}$.

9) $\operatorname{Re}(ze^{i\frac{\pi}{4}}) > 0$.

3. Which lines in the complex plane are represented by the equations:

1) $\operatorname{Im} z = 5$; 2) $\operatorname{Re}(ze^{i\frac{\pi}{3}}) = 0$; 3) $\operatorname{Re}(ze^{i\frac{\pi}{3}}) = -1$; 4) $\operatorname{Re} \frac{1}{z} = a$; 5) $\operatorname{Im} \frac{z-1}{z+1} = 0$