

Pmat 421 W09
Assignment # 1 due by Jan. 23,2009

Each questions is worth 5 points.

1. Express z in the form $a+ib$, with a, b real where $z = \frac{(1+i)(3-i)(-2-i)}{i(3+4i)(5-i)}$.
2. Find the sum $\sum_{n=0}^{300} i^n$.
3. Express z in the form $a + ib$, with a, b real where $z = \frac{(-1-i)^3}{(-\sqrt{3}+i)^2}$
use the polar form of $-1-i$ and $-\sqrt{3}+i$. Find (principal branch) Arg of z .
4. Show that $|z+w|^2 + |z-w|^2 = 2|z|^2 + 2|w|^2$ for any complex z and w .
5. Solve $z^{\frac{4}{3}} + 2i = 0$ i.e. find all possible z in the form $a + ib$, a, b real.
6. Find all z for which (a) $\operatorname{Im} \frac{1}{z} = -\operatorname{Im} z$ (b) $\operatorname{Re} \frac{1}{z} = -\operatorname{Re} z$.
7. Find all roots $(-8)^{\frac{1}{3}}$.
8. Define the branch of the argument where $\arg z = \theta \in [0, 2\pi)$
in terms of x and y for any $z = x + iy, z \neq 0$
For which z the following is true $\arg \bar{z} = -\arg z$ (the branch from above).
9. Find all accumulation points of the set $\{(-i)^n; n = 1, 2, 3, \dots\}$.
10. Describe or sketch the set $\left\{z; \operatorname{Im} \frac{1}{z} \geq \frac{1}{6}\right\}$. Is the set open, closed, bounded, connected? Explain.