

Pmat 421
Assignment # 2 due by Friday Feb 8 , 4pm.

Each questions is worth 5 points.

1. Express $(-\sqrt{3-i})^{99}$ in the form of $a + ib, a, b$ real.
2. Solve $z^2 = 7 - 24i$ in the form of $a + ib, a, b$ real.
3. For $w = \frac{1}{z}$ find the image of the set $S = \{z; |z| = 2, \text{Im } z > 0\}$.
4. What is the best upper bound of $|z - 3|$ if $z \in N_1(i)$ – the neighborhood of i with radius 1?
5. For $f(z) = e^{\frac{1}{z}}$ find the domain of definition and the functions u and v such that $f(z) = u(x, y) + iv(x, y)$ for $z = x + iy$. Is it onto C ? Explain..
6. Sketch/describe the set $\left|e^{z-\frac{1}{z}}\right| = 1$. Is it open, closed, bounded, connected? Explain.
7. Evaluate $\lim_{z \rightarrow i} \frac{z^2 + iz + 2}{3 + 4iz - z^2}$.
 - (a) Evaluate $\lim_{z \rightarrow 0} \frac{iz + \bar{z}}{|z|^2}$ if it exists.
 - (b) Evaluate $\lim_{z \rightarrow \infty} \frac{iz + \bar{z}}{|z|^2}$ if it exists.
8. Find all z where $f(z) = z^2\bar{z}$ is differentiable, then find $f'(z)$ for such z .
9. Define $f(z) = \frac{z^2}{\bar{z}}$ for $z \neq 0$ and $f(0) = 0$. Is f differentiable at 0? If so find $f'(0)$.