

Fall 2014 - Math 463
Complex Variables for Scientists and Engineers
Homework #4 - Due in class Tues. Sept. 30

1. For each limit below, answer with a complex number, ∞ or DNE (does not exist). Give some justification.

(a) $\lim_{z \rightarrow 2+i} \frac{z^2 - (2+i)^2}{z - (2+i)}$

(b) $\lim_{z \rightarrow \infty} \frac{z^2 + iz - 2}{(1-4i)z^2}$

(c) $\lim_{z \rightarrow \infty} \frac{z^3 + iz - 2}{(1-4i)z^2}$

(d) $\lim_{z \rightarrow i} \frac{z^2 - 1}{z^2 + 1}$

2. Find $f'(z)$ for the given functions:

(a) $f(z) = (3-4i)z^5 + 1/(iz)$

(b) $f(z) = (3z^2 + z)^5$

(c) $f(z) = \sin(e^{2z})$

(d) $f(z) = \text{Log}(5z^2)$

(e) $f(z) = e^{(2+i)z^2-1}$

3. Determine the points at which the given function is analytic.

(a) $f(z) = y + ix$

(b) $f(z) = \bar{z}^2$

(c) $f(z) = e^{ir\theta}$ (where z is nonzero with polar form $z = re^{i\theta}$).

4. Let $f(z) = x^2 + y^2 + 2ixy$. At which points z does $f'(z)$ exist? At which points z is f analytic?

5. Find all solutions to $\text{Log}(z) = 1 - i\pi/2$.

6. Sec. 38: 2,4,11,12