

Math 532: Homework 1  
Due 9/4/19  
Everyone turns in an individual copy.

1. From the textbook (2pts each), problems 1.5.4, 1.6.7, 1.9.3
2. (5pts) In both Cartesian and Polar coordinates, find the real and imaginary parts of  $f(z) = z^4$ .
3. (5pts) In both Cartesian and Polar coordinates, find the real and imaginary parts of  $f(z) = \frac{1}{1+z^2+z^4}$ .
4. (3pts) Show that  $|e^{i\theta}| = 1$ .
5. (3pts) Show, for  $z \in \mathbb{C}$  using  $z = |z|e^{i\theta}$  that  $|z^m| = |z|^m$ .
6. (3pts) Show for  $z, w \in \mathbb{C}$  that  $\overline{z+w} = \bar{z} + \bar{w}$ .
7. (3pts) Show for  $z, w \in \mathbb{C}$  that  $\overline{zw} = \bar{z} \bar{w}$ .
8. (5pts) (Yes, this is from the “Theory” work in class. I will frequently use Theory class problems as homework problems.) Using induction, show that for  $z, w \in \mathbb{C}$ ,  $m \in \mathbb{N}$

$$(z+w)^m = \sum_{l=0}^m \binom{m}{l} z^l w^{m-l}$$

9. (5pts) For  $z, w \in \mathbb{C}$ , show

$$|z+w| \leq |z| + |w|$$