

**Math 411**      **ASSIGNMENT 7**      **Due at 3 PM Thursday, January 23rd**

1. For the function  $f(z) = (x^2 + y) + i(y^2 - x)$ , determine where the function is differentiable and what the derivative is there, showing your work in the way demonstrated in class on 1/22.
2. In Assignment 6 you should have found that

$$\frac{1}{1-x} = 1 + x + x^2 + x^3 + x^4 + \dots \quad (1)$$

- (a) Use long division to determine the quotient  $\frac{1}{1+2x}$ . Go until you get to the fourth power term, and finish with  $\dots$ .
  - (b) Substitute  $-2x$  into both sides of (1) for  $x$  and simplify both sides.
  - (c) I'm up to something, of course. Observe your results, find errors if you think there are any.
3. Consider the values of  $z$  for which  $|z - 1| < |z - i|$ .
    - What do the quantities  $|z - 1|$  and  $|z - i|$  represent? Give your answer as two complete sentences of the form " $|z - 1|$  represents ..."
    - Use your answers to (a) to write a complete sentence that tells us what the given inequality is saying.
    - Where are the points for which  $|z - 1| = |z - i|$ ?
    - Neatly sketch the region where the inequality is true.
  4. Do Exercise 1(b) on page 66 of Churchill and Brown, working from left to right as done in class.
  5. Do Exercise 4 on page 67 of Churchill and Brown, working from left to right. You will need to use the first inequality that shows up on your formula sheets.

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