BONUS Quiz 1   Complex Analysis

Name: _____

ASSIGNED: **Friday February 19**
DUE: **Monday February 22**

Time Begun: _____

Time Ended: _____   Prof. Ron Buckmire

Topic : Mappings and Points Sets in the Extended Argand Plane

The **learning goal** of this bonus quiz is to provide another example of using functions as mappings and to give you more practice becoming familiar with describing and sketching point sets of complex numbers.

Reality Check:

EXPECTED SCORE : _____/**5**   ACTUAL SCORE : _____/**5**

Instructions:

1. Once you open the quiz, you have **30 minutes** to complete, please record your start time and end time at the top of this sheet.

2. You may use the book or any of your class notes. You must work alone.

3. If you use your own paper, please staple it to the quiz before coming to class. If you don't have a stapler, buy one. QUIZZES WITH UNSTAPLED SHEETS WILL NOT BE GRADED.

4. After completing the quiz, sign the pledge below stating on your honor that you have adhered to these rules.

5. Your solutions must have enough details such that an impartial observer can read your work and determine HOW you came up with your solution. You should use full sentences wherever possible.

6. Relax and enjoy yourself.

7. **This quiz is due on Monday February 22**, in class. NO LATE OR UNSTAPLED QUIZZES WILL BE ACCEPTED.

Pledge: I, _____, pledge my honor as a human being and Occidental student, that I have followed all the rules above to the letter and in spirit.

1. (*5 points*) This problem is about finding the image of $D = \{z \in \mathbb{C} | 0 \leq \mathrm{Arg}(z) \leq \pi/2 \cap |z| \leq 1\}$ under the inversion mapping $w = f(z) = 1/z$.

(a) (*1 point*) One part of the boundary of D consists of the line segment $\{0 \leq \mathrm{Re}(z) \leq 1 \cap \mathrm{Im}(z) = 0\}$. Sketch the image of this set under the inversion mapping $w = 1/z$. (Describe the image in the w-plane using complex inequalities, and in English.)

(b) (*1 point*) Another part of the boundary of D consists of the line segment $\{0 \leq \mathrm{Im}(z) \leq 1 \cap \mathrm{Re}(z) = 0\}$. Sketch the image of this set under the inversion mapping $w = 1/z$. (Describe the image in the w-plane using complex inequalities, and in English.)

(c) (*1 point*) The last part of the boundary of D is the circular arc segment $\{|z| = 1 \cap 0 \leq \mathrm{Arg}(z) \leq \pi/2\}$. Sketch the image of this set under the inversion mapping $w = 1/z$. (Describe the image in the w-plane using complex inequalities, and in English.)

(d) (*2 points*) Use your results from above to assist you in to sketch D and its image D' in the space below. [HINT: how do you know which points are in D' and which points are in its complement?]