**Assignment: Analyzing Operations with Complex Numbers**

Follow the directions to solve each problem. Be sure to show all work leading to your answer. Write explanations for your answers using complete sentences.

1. Look at the table. Two complex numbers, *f* and *g*, are given in the first column. The next three columns list operations to be performed using the various pairs of *f* and *g*. Complete the table, leaving all square roots in simplified radical form. Show all of your work below the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Values of *f* and *g* | *f*  *g* | *f*  *g* | *f* | *g* |
| *f*  8  5*i*, *g*  8  5*i* |  |  |  |  |
| *f*  2  3*i*, *g*  2  3*i* |  |  |  |  |
| *f*  7  *i*, *g*  7  *i* |  |  |  |  |

2. Complex number pairs, such as *f* and *g* listed in the table above, are called complex conjugates. For example, the complex numbers 8  5*i*  and 8  5*i*  are conjugates. Describe

two patterns related to complex conjugates you see in the table in problem 1.

3. Plot each pair of conjugates on the coordinate plane below. How are the points of each pair related? Explain your answer.



4. Will the absolute value of a complex number and its conjugate always be equal? Why or why not? Explain your reasoning using the definition of the absolute value of a complex number.

5. Select two more patterns involving complex conjugates to investigate. For example, explore what happens when you subtract conjugates. Complete the table by writing three conjugate pairs of your choice and two patterns to investigate. Show all of the work for your calculations.

|  |  |  |
| --- | --- | --- |
| Values of *f* and *g* | First Operation  (For example, *f*  *g* ) | Second Operation |
| Complex Conjugate Pair 1 |  |  |
| Complex Conjugate Pair 2 |  |  |
| Complex Conjugate Pair 3 |  |  |

6. What patterns did you discover in problem 5? Explain the patterns you found. If you did not find any patterns, explain why you think none were found,