Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (please print)

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ECE 2202 – Quiz #4

November 2, 2017

Keep this quiz closed and face up until you are told to begin.

1. This quiz is closed book, closed notes. You may use one 8.5” x 11” crib sheet, or its equivalent.

2. Show all work on these pages. Show all work necessary to complete the problem. A solution without the appropriate work shown will receive no credit. A solution which is not given in a reasonable order will lose credit.

3. It is assumed that your work will begin on the same page as the problem statement. If you choose to begin your work on another page, you must indicate this on the page with the problem statement, with a clear indication of where the work can be found. **If your work continues on to another page, indicate clearly where your work can be found. Failure to indicate this clearly will result in a loss of credit.**

4. Show all units in solutions, intermediate results, and figures. Units in the quiz will be included between square brackets.

5. Do not use red ink. Do not use red pencil.

6. You will have 30 minutes to work on this quiz.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/20

Room for extra work

For the equations below, the variables *a*, g, *b*, and *d* are all real variables. They could be negative or positive in value. For a complex quantity **E**, the quantity **E**\* is the complex conjugate of **E**. In your solutions, show your steps clearly.

1. {10 points} Find all of the values for *a* and *g* that satisfy the equation



1. {10 points} Find all of the values for *b* that satisfy the equation



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Room for extra work

Solution:

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**Solution:**

1. We apply algebra to get



Using a calculator, we can simplify to



Our answers then are



1. We can again apply algebra to get


where we have taken complex conjugates of two of the expressions. We can again use a calculator on the right hand side to get



Now, we are not interested in finding *d*, so we take the phase of both sides of the equation to eliminate *d* from the equation. We get



Solving, we get



We can check this, by noting that the phase of the term (6+*b*j) is 35.4 which is in the 1st quadrant, so the imaginary part of (6+*b*j) must be positive, and it is. We should always make this kind of check when we take an arctangent, to make sure that we get the right signs for our solutions. To be precise, in this particular problem we took a tangent, but a quick check cannot hurt in any situation.

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