Name:————————————————————   Section: 100

Please complete the following exercises. Please answer individually (no collaboration).

1. Simplfy each quantity to the form $a + bi$:

   (a) $(3 + 2i) + (4 - 7i)$

   (b) $(1 + i)^2$

   (c) $(1 + i)^{-1}$

   (d) $\frac{2i}{3+i}$

   (e) $|3 - 4i|$

2. Give the roots to the quadratic equation $z^2 - 2z + 5$ as $z = x + iy$.

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3. If $z = x + iy$, describe the relationship between $|z|$ and z^{-1}.

   Hint: Write down each of these in terms of x and y.

4. (a) Carefully compute the product $(2 + 3i)(-1 + 4i)$.

   (b) If you know linear algebra: Compute the product $\begin{pmatrix} 2 & 3 \\ -3 & 2 \end{pmatrix}\begin{pmatrix} -1 & 4 \\ -4 & -1 \end{pmatrix}$.

   Even if you don't know linear algebra, I bet you can find a tool online that can multiply two matrices.

5. Bonus: Considering the above, how would you relate $|2 + 3i|$ or $|-1 + 4i|$ to the respective matrices?