Warm up problems for Complex Variables

Here are a few warm up problems for Complex Variables. I will show you on Wednesday how you will turn HW assignments like this in so be sure to bring a laptop to class this Wednesday!

The problems

1. Express the following numbers in the form $a + bi$.

   a. $(7 - 2i)(3i + 5)$
   b. i^{275}
   c. $(1 + i)^4$

2. Let $z_1 = (x_1, y_1)$ and $z_2 = (x_2, y_2)$ be complex numbers.

   a. Show that
   $$\text{Re}(z_1 + z_2) = \text{Re}(z_1) + \text{Re}(z_2).$$
   b. Find a counter example to the claim that
   $$\text{Re}(z_1 z_2) = \text{Re}(z_1)\text{Re}(z_2).$$

3. Let $P(z) = a_n z^n + a_{n-1} z^{n-1} \cdots + a_1 z + a_0$ be a polynomial and suppose that z_0 is a root of P. Show that $\overline{z_0}$ is also a root of P.
   Hint: The algebraic properties of the conjugate imply that
   $$\overline{P(\overline{z})} = P(z).$$

   You may use this fact.