Complex Solutions to Quadratic Equations and Complex Number Arithemtic

Work within a small group to answer these questions. Do not race through the exercises on your own. Always make sure that your entire group feels good about a question and answer before you move to the next exercise. Ask your group mates for explanations if you feel uncertain about something, and offer your explanations to others when you understand an exercise but someone else may not.

1. Solve the following quadratic equations using either the the Quadratic Formula or completing the square. If the solutions are complex, express them in standard form $a + bi$.

   a) $x^2 + 4x = -3$

   b) $x^2 - x + 1 = 0$

   c) $2x^2 - 3x = -2$

   d) $36x^2 + 12x + 1 = 0$

2. For each quadratic equation, calculate the discriminant. Then decide how many real solutions there are and how many non-real solutions there are.

   a) $2x^2 + 2x + 8 = 0$

   b) $-x^2 + 3x + 2 = 0$

   c) $4x^2 - 20x + 25 = 0$

3. Use i to write the expression:

a) $\sqrt{-144}$ b) $\sqrt{-64}$ c) $\sqrt{-12}$ d) $\sqrt{-5}$

4. Write the expression in standard form.

a) $(1-i)+(5-7i)$ b) $2i+(-8+5i)$ c) $(2-7i)-(1+2i)$

d) $5i-(10-2i)$ e) $(3+2i)(-1+5i)$ f) $(5+4i)(5-4i)$

g) $(2+i)^2$ h) $i(1+i)^2$

5. Write the expression in standard form.

a) $\dfrac{-6}{2-i}$ b) $\dfrac{3i}{5+2i}$ c) $\dfrac{8+9i}{5-2i}$ d) $\dfrac{5+7i}{1-i}$