Lesson 5.06 Note Taking Study Guide

Steps for Solving Quadratic Equations with Complex Numbers.

If a quadratic formula does not have a real number solution then the solution would a _________ number.

An example of a complex number would be $3 \pm 2i$.

An $i$ becomes part of your solution when there is a_____ under the square root.

Examples of simplifying radicals with a negative underneath.

1. \[ \sqrt{-16} = 4i \]
2. \[ \sqrt{-50} = 5i\sqrt{2} \]
3. \[ \sqrt{-27} + \sqrt{-75} = 3i\sqrt{3} + 5i\sqrt{3} = 8i\sqrt{3} \]
4. \[ \frac{\sqrt{-72}}{12} = \frac{6i\sqrt{2}}{12} = \frac{i\sqrt{2}}{2} \]

The two methods that can be used to solve quadratic equations with non-real solutions are ______________________ the___________ and ________________formula.

Steps to complete the square include:
1. Isolate the term containing the______________.
2. Complete the ________________.
4. Solve for the ________________.

Example: Solve \[ x^2 - 4x + 17 = 0 \] by completing the square.
1. \[ x^2 - 4x = -17 \]
2. \[ -4 \div 2 = -2 \rightarrow (-2)^2 = 4 \]
\[ x^2 - 4x + 4 = -17 + 4 \]
3. \((x - 2)(x - 2) = -13\)
\((x - 2)^2 = -13\)
\(\sqrt{(x - 2)^2} = \pm \sqrt{-13}\)

4. \(x - 2 = \pm i\sqrt{13}\)
\(+ 2\)
\(x = 2 \pm i\sqrt{13}\)

The quadratic formula is \(x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\).

Steps to solve using the quadratic formula include:
1. Write the equation in \(ax^2 + bx + c = 0\) form.
2. Identify your \(a\), \(b\), and \(c\) values.
3. Apply and simplify the quadratic formula.

Example: Solve \(x^2 + 5x = -12\) using the quadratic formula.

1. \(x^2 + 5x + 12 = 0\)
2. \(a = 1; b = 5; c = 12\)
   \[x = \frac{-5 \pm \sqrt{5^2 - 4(1)(12)}}{2(1)}\]
   \[x = \frac{-5 \pm \sqrt{25 - 48}}{2}\]
   \[x = \frac{-5 \pm \sqrt{-23}}{2}\]
   \[x = \frac{-5 \pm i\sqrt{23}}{2}\]