Derivation of the Quadratic Formula:
\[ ax^2 + bx + c = 0 \] complete the square

Solve Using the Quadratic Formula:
\[
2x^2 - 3x = 5 \quad -x(x-6) = 11
\]
\[
6x^2 - 5x = 4 \quad y(y+3) = 2
\]

Now: consider \[ 2x^2 - 5x + 9 = 0 \]
what kind of roots does this have?

\[
3x^2 = -x + 2
\]
\[
-2x(2x-3) = -1
\]
\[
3.6x^2 = -1.2x - 0.1
\]

\[ a^2 + bx + c = 0 \] \( a, b, c \in \mathbb{R} \) and \( a \neq 0 \)

**Discriminant** = \[ b^2 - 4ac \]

* If \( b^2 - 4ac > 0 \) \( \exists \) two real solutions
  * if \( b^2 - 4ac = \) perfect square the solutions are rational
  * if \( b^2 - 4ac = \) not a perfect square the solutions are irrational

* If \( b^2 - 4ac < 0 \) \( \exists \) two complex conjugates

* If \( b^2 - 4ac = 0 \) \( \exists \) one (double) solution