Math 104Q

Roots and Factorization of Trinomials

☺ **A trinomial (or quadratic)** is an expression of the form $ax^2 + bx + c$, where x is a variable and a, b and c are numbers, $a \neq 0$.

☺ **A root (or a solution)** of a quadratic equation $ax^2 + bx + c = 0$ is a number, call it r, for which the equation holds when r is substituted for x, that is $ar^2 + br + c = 0$.

☺ **A formula for finding the roots of $ax^2 + bx + c = 0$:**

$$r = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

When doing the calculations, you may find two roots, call them r_1 and r_2.
Or you may find one root only. Or you may not find any root at all.

☺ **A formula for factoring a trinomial $ax^2 + bx + c$:**

$$ax^2 + bx + c = a(x - r_1)(x - r_2)$$

Where r_1 and r_2 are the two roots of the quadratic equation $ax^2 + bx + c = 0$.
In case the quadratic equation has one root, both r_1 and r_2 are that root.
In case the quadratic equation has no root, the trinomial cannot be factored.

☺ **Two Useful Formulas:** $(a \pm b)^2 = a^2 \pm 2ab + b^2$

$$a^2 - b^2 = (a + b)(a - b)$$

☺ **Reminder:** When factoring a polynomial completely, first "factor out" the greatest common factor of all its terms.