Competitive Math Notes

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1 Quadratics

1.1 Basic factoring

Given some ax^2+bx+c, try and find the factorization $(sx+u)(tx+v)$ by expanding this template expression.

Fact 1.1 *If one root is 0, the product of roots is 0 so the equation is of form* $ax^2+bx=0$.

Fact 1.2 *Difference of squares are of the form* $x^2-a^2=0 \implies (x-a)(x+a)=0$.

Fact 1.3 *A perfect square is of the form* $(x+a)^2=x^2+2ax+a^2$. *This is a case of a "double root."*

1.2 Quadratic Formula

By manipulating $ax^2+bx+c=0$ by completing the square, the quadratic formula can be found.

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a} \tag{1}$$

1.3 Rearrangements