$ax^2+bx+c = 0$, let us consider the Solution Matrix of x of this solution to be $x = \begin{bmatrix} \propto & \beta \\ -\beta & \alpha \end{bmatrix}$

- $x^2 = x.x = \begin{bmatrix} \propto & \beta \\ -\beta & \alpha \end{bmatrix} . \begin{bmatrix} \propto & \beta \\ -\beta & \alpha \end{bmatrix} = \begin{bmatrix} \alpha^2 - \beta^2 & 2\alpha\beta \\ -2\alpha\beta & \alpha^2 - \beta^2 \end{bmatrix}$
- $ax^2+bx+c = 0$
- $a\begin{bmatrix} \alpha^2 - \beta^2 & 2\alpha\beta \\ -2\alpha\beta & \alpha^2 - \beta^2 \end{bmatrix} + b\begin{bmatrix} \propto & \beta \\ -\beta & \alpha \end{bmatrix} + \begin{bmatrix} c & 0 \\ 0 & c \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
- $\begin{bmatrix} a\alpha^2 - a\beta^2 + b\alpha + c & 2\alpha\beta + b\beta \\ -2(a)\alpha\beta - b\beta & a\alpha^2 - a\beta^2 + b\alpha + c \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
- $a(\alpha^2 - \beta^2) + b\alpha + c = 0$ &
- $2\alpha\beta + b\beta = 0$
- $2\beta(\alpha + b) = 0$
- $\beta = 0$
- $a\alpha^2 + b\alpha + c = 0$
- $\alpha = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \begin{bmatrix} \propto & \beta \\ -\beta & \alpha \end{bmatrix}$ Solution Matrix of x of this Equation $ax^2+bx+c = 0$

- $\alpha = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$
- $\beta = 0$
- $x = \begin{bmatrix} \frac{-b \pm \sqrt{b^2-4ac}}{2a} & 0 \\ 0 & \frac{-b \pm \sqrt{b^2-4ac}}{2a} \end{bmatrix}$

  Let's consider $D = b^2 - 4ac$

- $\begin{bmatrix} \frac{-b \pm \sqrt{D}}{2a} & 0 \\ 0 & \frac{-b \pm \sqrt{D}}{2a} \end{bmatrix}$
- $b/2a \begin{bmatrix} -1 \pm \sqrt{D}/b & 0 \\ 0 & -1 \pm \sqrt{D}/b \end{bmatrix}$
- $b/2a \left\{ \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} \pm \begin{bmatrix} \sqrt{D}/b & 0 \\ 0 & \sqrt{D}/b \end{bmatrix} \right\}$
- $b/2a \left\{ (-1) . \mathrm{I} \pm \begin{bmatrix} \sqrt{D}/b & 0 \\ 0 & \sqrt{D}/b \end{bmatrix} \right\}$
- $-b/2a \left\{ \mathrm{I} \mp \begin{bmatrix} \sqrt{D}/b & 0 \\ 0 & \sqrt{D}/b \end{bmatrix} \right\}$

for D < 0, $\sqrt{\mathrm{D}} = \mathrm{i}\sqrt{\mathrm{D}}$
So,

Most important Findings/observation -#1

it applies a phase of Π/2 from |+> state Along z axis & lands at |i+> state if D<0

Say for example for higher order of solution for X^n = 1 I mean to say for finding the nth root of 1 This Solution could be useful, right, cause (n - 1) Roots are imaginary. say for example for X^5 = 1 please do kindly note that Most of the roots, I mean to say the 4 roots of 1 are imaginary.