Obtain x_3 by solving $P(x_3)=0$

$$P(x_3)=a(x_3-x_2)^2+b(x_3-x_2)+c=0 \quad \text{---} \quad (4)$$

Instead of using traditional formula, we use

$$ax^2+bx+c=0$$

$$x=\frac{-2c}{b\pm\sqrt{b^2-4ca}}$$

Choose + or − so that the denominator is the largest in magnitude

$(4) \Rightarrow$

$$x_3-x_2=\frac{-2c}{b\pm\sqrt{b^2-4ca}}$$

$$x_3=x_2+\frac{-2c}{b\pm\sqrt{b^2-4ca}}$$

Note Step II can also be performed as given below, however, for computational accuracy, computations by solving 2×2 linear system to obtain a & b is recommended.

$$b=\frac{(x_0-x_2)^2\left[f(x_1)-f(x_2)\right]-(x_1-x_2)^2\left[f(x_0)-f(x_2)\right]}{(x_0-x_2)(x_1-x_2)(x_0-x_1)}$$

$$a=\frac{(x_1-x_2)\left[f(x_0)-f(x_2)\right]-(x_0-x_2)\left[f(x_1)-f(x_2)\right]}{(x_0-x_2)(x_1-x_2)(x_0-x_1)}$$