

Finding Maximum and Minimum point using Squaring Method

General equation for quadratic equation

$$y = ax^2 + bx + c \text{ General Quadratic Equation}$$

Example:

Find the maximum and minimum point for the following quadratic equation. Find the points for x-intercepts and y- intercepts

$$f(x) = 2x^2 + 15x + 6$$

Solution:

$$f(x) = 2x^2 + 15x + 6$$

$$f(x) = 2\left(x^2 + \frac{15}{2}x + \left(\frac{15}{4}\right)^2 - \frac{5^2}{4} - 6\right)$$

$$f(x) = 2\left(x + \frac{15}{2}\right)^2 - \frac{15^2}{4} - 6$$

$$f(x) = 2\left[\left(x + \frac{15}{2}\right)^2 - \frac{225}{16} - \frac{96}{16}\right]$$

$$f(x) = 2\left[\left(x + \frac{15}{2}\right)^2 - \frac{321}{16}\right]$$

$$f(x) = 2\left(x + \frac{15}{2}\right)^2 - (2)\frac{321}{16}$$

$$f(x) = 2\left(x + \frac{15}{2}\right)^2 - \frac{321}{8}$$

Minimum point  $\left(-\frac{15}{2}, -\frac{321}{8}\right)$

**x- intercepts**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-15 \pm \sqrt{15^2 - 4(2)(6)}}{2(2)} = \frac{-25 \pm 10.81}{4}$$

$$x = -8.95 \text{ or } x = -3.55$$

**y- intercepts**

$$f(0) = 2(0)^2 - 15(0) + 6 = 6$$

Question

Find the minimum, maximum , x intercepts and y intercepts

$$f(x) = x^2 + 6x + 8$$

Question

Find the minimum, maximum , x intercepts and y intercepts

$$f(x) = 2x^2 + 12x + 8$$