Pre-Calculus

Sept 8

ex $y = 2x$ $\quad y = 5x + 1$

sub → $2x = 5x + 1$

$-1 = 3x$

$-\frac{1}{3} = x$

$y = 2(-\frac{1}{3})$

$= -\frac{2}{3}$

∴ point of intersection is $(-\frac{1}{3}, -\frac{2}{3})$

ex $y = 2x^2 + 4x - 1$

y-int: $y = 2(0)^2 + 4(0) - 1$

$= -1$

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

$= \frac{-4 \pm \sqrt{(4)^2 - 4(2)(-1)}}{2(2)}$

$= \frac{-4 \pm \sqrt{24}}{4}$

$= \frac{-4 \pm 2\sqrt{6}}{4}$

$= \frac{2 \pm \sqrt{6}}{2}$

where is the vertex?

midpoint of roots is $x = -1$ ∴ vertex is $(-1, -3)$

when $x = -1$, $y = -3$

or "complete the square"

$y = 2x^2 + 4x - 1$

$= 2(x^2 + 2x) - 1$

$= 2(x^2 + 2x + 1 - 1) - 1$

$= 2(x^2 + 2x + 1) - 2 - 1$ ∴ vertex is $(-1, -3)$

$= 2(x + 1)^2 - 3$

or $x = \frac{-b}{2a}$

to prove the quadratic formula

$a\left[x + \frac{b}{2a}\right]^2 = \frac{b^2}{4a} - c$

$\left[x + \frac{b}{2a}\right]^2 = \frac{b^2}{4a^2} - \frac{c}{a}$

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

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

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

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