9.5 Solving Cubics

$y = (x+3)(x-2)(x-5)$

get rid of y add 0

$0 = (x+3)(x-2)(x-5)$

$x+3=0 \quad x-2=0 \quad x-5=0$
$x=-3 \quad x=2 \quad x=5$

$X -3, 2, 5$

$0 = (x+3)^2(x-3)$

$x = -3, -3, 3$

$x = -3(dbl), 3$

$0 = (x-1)^3$

$x = 1 \ (typ)$

Notice

$y = 2x^3 + 5x^2 + 3x$

$y = x(2x^2 + 5x + 3)$

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

$ax^2 + bx + c \quad a=2 \ b=5 \ c=3$

$\dfrac{-5 \pm \sqrt{25 - 24}}{4} = \dfrac{-5 \pm \sqrt{1}}{4} = \dfrac{-5 \pm 1}{4}$

$\dfrac{-5+1}{4} = \dfrac{-4}{4} = -1$

$\dfrac{-5-1}{4} = \dfrac{-6}{4} = -\dfrac{3}{2}$

$0, -1, -\dfrac{3}{2}$

$x^2 - 3x + 40$

$\boxed{\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}}$

$\dfrac{3 \pm \sqrt{9 - 160}}{2}$

$\dfrac{3 \pm \sqrt{-151}}{2}$

$\dfrac{3 \pm \sqrt{151}\,i}{2} = \dfrac{3 \pm 12.23i}{2}$

$\dfrac{3}{2} \pm \dfrac{12.23}{2}i$

Grouping (4 terms)

$\underline{ax^3 + bx^2} + \underline{cx + d}$

$\underline{x^3 + 2x^2} - \underline{4x - 8}$

$x^2(x+2) - 4(x+2)$ Same then Regroup

$0 = (x^2 - 4)(x+2)$

$0 = x^2 - 4 \quad 0 = x+2 \quad x = 2, -2(dbl)$

$\sqrt{4} = \sqrt{x^2}$
$\pm 2 = x$

$-2 = x$