

Rational Zeros

(Solving)

find the ~~corrected~~ zeros:

ex1 a) $y = x^2(x-5)$

$x=0, x=5$

b) $y = (x-7)^2(x+3)^3$

$x=7, x=-3$

c) $y = (x-7)(x^2-2)$

$x=7, x^2=2$
 $x = \pm\sqrt{2}$

d) $y = (x+3)(x-2i)$

$x=-3, x=2i$

rational: can be written as a fraction!

rational zero test

possible zeros = $\frac{\text{factors of constant}}{\text{factors of L.C.}}$

ex2 find the possible zeros.

a) $x^3 + 3x^2 - 7x + 5$

$\frac{\pm 5, \pm 1}{\pm 1} = \boxed{\pm 5, \pm 1}$

b) $2x^3 - 7x + 3$

$\frac{\pm 3, \pm 1}{\pm 1, \pm 2} = \boxed{\pm 3, \pm 1, \pm \frac{3}{2}, \pm \frac{1}{2}}$

(find rational zeros)

ex3 $2x^3 + 3x^2 - 8x + 3$

① P.Z. = $\frac{\pm 1, \pm 3}{\pm 1, \pm 2} = \pm 1, \pm 3, \pm \frac{1}{2}, \pm \frac{3}{2}$

② SD to find zeros: x^2

$$\begin{array}{r|rrrr} -1 & 2 & 3 & -8 & 3 \\ & \downarrow & & & \\ & 2 & -1 & 9 & \\ \hline & 2 & 1 & -9 & | 12 \end{array} X$$

$$\begin{array}{r|rrrr} 1 & 2 & 3 & -8 & 3 \\ & \downarrow & & & \\ & 2 & 5 & -3 & \\ \hline & 2 & 5 & -3 & | 0 \end{array} \checkmark$$

③ factor
 $(x-1)(2x^2+5x-3)$
 $(x-1)(2x-1)(x+3)$

$\boxed{x=1, \frac{1}{2}, -3}$
zeros

Ex 4 Find the rational zeros $x^4 - x^3 + x^2 - 3x - 6$

① P.Z. = $\frac{\pm 1 \pm 2 \pm 3 \pm 6}{\pm 1} = \pm 1 \pm 2 \pm 3 \pm 6$

② SD to find zeros: get to x^2

$$\begin{array}{r|rrrrr} -3 & 1 & -1 & 1 & -3 & -6 \\ & \downarrow & -3 & 12 & -39 & 126 \\ \hline & 1 & -4 & 13 & -42 & 120 \end{array} \quad \times$$

$$\begin{array}{r|rrrrr} -1 & 1 & -1 & 1 & -3 & -6 \\ & \downarrow & -1 & 2 & -3 & 6 \\ \hline & 1 & -2 & 3 & -6 & 0 \end{array} \quad \checkmark \quad (x+1)$$

↙

$$\begin{array}{r|rrrr} 2 & 1 & -2 & 3 & -6 \\ & \downarrow & 2 & 0 & 6 \\ \hline & 1 & 0 & 3 & 0 \end{array} \quad \checkmark \quad (x-2)$$

③ $x^2 + 3$ not factorable

④ $x = -1; x = 2$