# Rational Root Theorem:

$y = \underline{2}x^3 - x^2 + 2x + 5$

$(x-\#)(x^2+x+c)$

The only possible Rational Roots of a polynomial have the form

$\text{Rational Roots} = \frac{\text{factor of Constant Term}}{\text{factor of Leading Coefficient}}$

$= \frac{\text{factors of } 5}{\text{factors of } 2}$

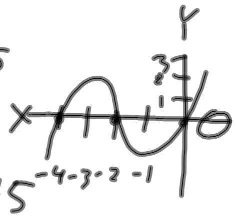
$= \frac{\pm 1 \text{ or} \pm 5}{\pm 1 \text{ or} \pm 2}$

$\cancel{1}\ \cancel{\frac{1}{1}}, \cancel{\frac{1}{2}}, \overset{5}{\cancel{\frac{5}{1}}}, \frac{5}{2}, \overset{-1}{\cancel{\frac{-1}{1}}}, -\frac{1}{2}, \overset{-5}{\cancel{\frac{-5}{1}}}, -\frac{5}{2}$

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

$0 = 2(1)^3 - (1)^2 + 2(1) + 5$

$0 = 2 - 1 + 2 + 5 = 8$



$0 = 2\left(\frac{1}{2}\right)^3 - \left(\frac{1}{2}\right)^2 + 2\left(\frac{1}{2}\right) + 5$

$0 = 2\left(\frac{1}{8}\right) - \frac{1}{4} + 1 + 5$

$0 = \frac{1}{4} - \frac{1}{4} + 1 + 5 = 6$

$y = 2(-1)^3 - (-1)^2 + 2(-1) + 5$

$0 = 2(-1) - 1 - 2 + 5$ $a = -1$

$\boxed{0 = -2 - 1 - 2 + 5 = 0}$

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

$(x-a)$ where $a$ is factor

$(x-(-1))$

$$\begin{array}{r} 2x^2 - 3x + 5 \\ x+1 \enclose{longdiv}{2x^3 - x^2 + 2x + 5} \\ -(2x^3 + 2x^2) \\ \hline -3x^2 + 2x + 5 \\ -(+3x^2 + 3x) \\ \hline 5x + 5 \\ 5x + 5 \\ \hline 0 \end{array}$$

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

Steps

1) List the constant Terms Factors (Including Negatives)

2) List the leading Coefficient's Factors

3) Create Fractions by dividing the constant Term by the Coefficients Term

$$\frac{\text{Constant}}{\text{Coefficient}}$$

4) Plug each Fraction into the function and see if it equals zero. If it does, you have a factor "a". $(X-a)$

5) Divide by new binomial to find New factors.

$y=15x^3-32x^2+3x+2$

1) Constant Terms: $\pm 1, \pm 2$

2) $\pm 1, \pm 15, \pm 3, \pm 5$

3) $1, \boxed{2}, \frac{1}{15}, \frac{2}{15}, \boxed{\frac{1}{3}}, \frac{2}{3}, \frac{1}{5}, \frac{2}{5}$

$-1, -2, \frac{-1}{15}, \frac{-2}{15}, \frac{-1}{3}, \frac{-2}{3}, \boxed{\frac{-1}{5}}, \frac{-2}{5}$

$=15(2)^3-32(2)^2+3(2)+2$

$=15(8)-32(4)+6+2$

$=120-128+8$

$=-8+8$

$=0$

$2$

$(x-a)$

$(x-2)$

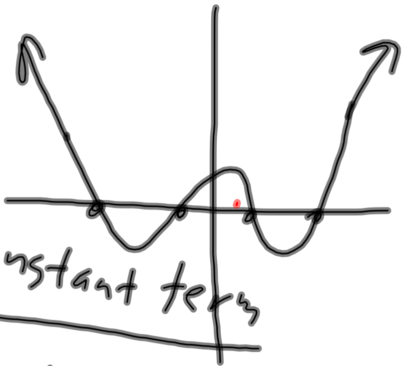
$$\begin{array}{r} 15x^2-2x-1 \\ x-2\overline{\big)\,15x^3-32x^2+3x+2} \end{array}$$

$(5x+1)(3x-1)$

$\frac{-1}{5}, \frac{1}{3}$

# Rational Root Theorem:

$y = \textcircled{2}x^3 - x^2 + 2x + \underline{5}$



$$\frac{\text{Factors of the constant term}}{\text{Factors of the leading coefficient.}}$$

$$\frac{\text{Factors } 5}{\text{Factors } 2} = \frac{\pm 1, \pm 5}{\pm 1, \pm 2} = \frac{1}{1}, \frac{1}{2}, \frac{5}{1}, \frac{5}{2}$$

$-1, -\frac{1}{2}, -5, -\frac{5}{2}, 1, \frac{1}{2}, 5, \frac{5}{2}$

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

$0 = 2(1)^3 - (1)^2 + 2(1) + 5$

$0 = 2 - 1 + 2 + 5$

$0 = 8$

$(x-(-1))$

$(x+1)$

$-1$ is a factor

$y = 2(-1)^3 - (-1)^2 + 2(-1) + 5$

$0 = 2(-1) - 1 - 2 + 5$

$0 = -2 - 1 - 2 + 5$

$0 = 0$

$$\begin{array}{r} 2x^2 - 3x + 5 \\ x+1 \overline{\big)\, 2x^3 - x^2 + 2x + 5} \\ -(2x^3 + 2x^2) \\ \hline -3x^2 + 2x + 5 \\ (-3x^2 - 3x) \\ \hline 5x + 5 \\ 5x + 5 \\ \hline \end{array}$$

$y = (x+1)(2x^2 - 3x + 5)$

$x^3-5x^2+17x-13$

1) $-13$ Factors $\pm 1, \pm 13$

2) $1$ Factors $\pm 1$

3) $\frac{1}{1}, \frac{13}{1} \Rightarrow \textcircled{1}, 13, \textcircled{-1}, -13$

$-1 \Rightarrow (x-(-1) \Rightarrow (x+1)$

Complete Questions

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