November 18, 2015

$p(x) = 3x^5 + 5x^4 - 4x^3 + 7x + 3$

ⓐ Find the quotient & remainder when $p(x)$ is divided by $x+2$

ⓑ Use the Remainder Theorem to find $p(-2)$

Nov 18-10:56 AM

$$\begin{array}{r|rrrrrr} -2 & 3 & 5 & -4 & 0 & 7 & 3 \\ & & -6 & 2 & 4 & -8 & 2 \\ \hline & \boxed{3} & -1 & -2 & 4 & -1 & \boxed{5} \end{array}$$

✓① $q(x) = 3x^4 - x^3 - 2x^2 + 4x - 1$

✓② $r(x) = 5$

$$\boxed{3x^4 - x^3 - 2x^2 + 4x - 1 \quad \frac{5}{x+2}}$$

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$p(-2) = 3(-2)^5 + 5(-2)^4 - 4(-2)^3 + 7(-2) + 3$

$= 3(-32) + 5(16) - 4(-8) - 14 + 3$

$= -96 + 80 + 32 - 14 + 3$

$= -16 + 32 - 14 + 3$

$= 16 - 14 + 3$

$= 2 + 3$

$= 5$

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$3x^5 + 5x^4 - 4x^3 + 7x + 3$

$(x+2) \cdot (3x^4 - x^3 - 2x^2 - 4x - 1)$

List the rational zeros

$\frac{\text{factors } p \text{ (Constant term)}}{\text{factors } q \text{ (Leading term)}}$

$\frac{p = -1}{q = 3} = \frac{\pm 1}{\pm 3} = \pm 1, \pm 3$

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$p(x) = \overset{q}{\boxed{2}}x^3 + x^2 - 13x \overset{p}{\boxed{+6}}$

$\frac{\text{factors of } p \;\; 6}{\text{factors of } q \;\; 2} = \frac{\pm 1, \pm 2, \pm 3, \pm 6}{\pm 1, \pm 2}$

$\pm 1, \pm \frac{1}{2}, \pm 2, \pm 3, \pm \frac{3}{2}, \pm 6$

Rational Zero Theorem

$p(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 + a_0$

$\frac{p}{q}$ where p is the factors of a_0 & q is the factors of a_n

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Even $f(x) = f(-x)$

odd $f(-x) = -f(x)$

$-(\;f(x)\;)$

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$$x\left(x^3+3x^2-13x-15\right)$$

$$\frac{p}{q}=\frac{-15}{1}=\underline{\pm1,\ \pm3,\ \pm5,\ \pm15}$$

$$x\left(x-3\right)$$

$$3\ \begin{array}{|cccc}1 & 3 & -13 & -15\\ \hline & & & \\ \hline\end{array}$$

$$\overset{F}{x^2}\ \overset{O\,\&\,I}{\boxed{+6x}}+\overset{L}{5}=\overset{O}{(x+5)}\underset{I}{(x+1)}$$

$$\begin{array}{r}x\\5x\\ \hline 6x\end{array}$$

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$$\overset{a}{3x^2}+\overset{b}{2x}-\overset{c}{5}\qquad ac=-15$$

$$b=2$$

$$\begin{array}{c|c}+ & -\\ \hline 5 & 3\end{array}$$

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

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

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

$x=0$

$x=2$

$x=1$

$x=-\frac{5}{3}$

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