

Theory Of Equations

Polynomials

Horner's Method Of Synthetic Division

Use synthetic division to express

$$f(x) = x^3 - 6x^2 + 8x + 7 \quad \text{as a}$$

polynomial in powers of $x+2$.

Sol.

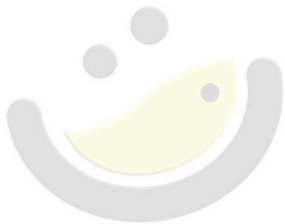
The Given Polynomial is

$$f(x) = x^3 - 6x^2 + 8x + 7.$$

$$\text{Let } f(x) = a_0 + a_1(x+2) + a_2(x+2)^2 + a_3(x+2)^3 \quad \text{--- ①}$$

Where a_0, a_1, a_2, a_3 are constants.

Divide $f(x)$ by $x+2$ by synthetic division repeatedly.



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$$\begin{array}{c|cccc}
 -2 & 1 & -6 & 8 & 7 \\
 \hline
 & & -2 & 16 & -48
 \end{array}$$

$$\begin{array}{c|cccc}
 -2 & 1 & -8 & 24 & -41 = a_0 \\
 \hline
 & & -2 & 20 &
 \end{array}$$

$$\begin{array}{c|cccc}
 -2 & 1 & -10 & 44 & = a_1 \\
 \hline
 & & -2 & &
 \end{array}$$

$$\begin{array}{c|cccc}
 & 1 & & -12 & = a_2 \\
 \hline
 & & & &
 \end{array}$$

$$\begin{array}{c|cccc}
 & 1 & & & = a_3. \\
 \hline
 & & & &
 \end{array}$$

Put values of a_0, a_1, a_2 and a_3 in ①

$$f(x) = -41 + 44(x+2) - 12(x+2)^2 + (x+2)^3$$

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Ans

