Factorisation of Polynomials Ex 6.3 Q4

Answer :

Let us denote the given polynomials as

$$f(x)=4x^3-12x^2+14x-3,$$
$$g(x)=2x-1$$
$$\Rightarrow \quad g(x)=2\left(x-\frac{1}{2}\right)$$

We have to find the remainder when $f(x)$ is divided by $g(x)$.

By the remainder theorem, when $f(x)$ is divided by $g(x)$ the remainder is

$$f\left(\frac{1}{2}\right)=4\left(\frac{1}{2}\right)^3-12\left(\frac{1}{2}\right)^2+14\left(\frac{1}{2}\right)-3$$
$$=4\times\frac{1}{8}-12\times\frac{1}{4}+14\times\frac{1}{2}-3$$
$$=\frac{1}{2}-3+7-3$$
$$=\boxed{\frac{3}{2}}$$

Now we will calculate the remainder by actual division

$$\begin{array}{r|l} & 2x^2-5x+\frac{9}{2} \\ \hline 2x-1 & 4x^3-12x^2+14x-3 \\ & 4x^3-2x^2 \\ & \quad - \quad + \\ \hline & \quad -10x^2+14x-3 \\ & \quad -10x^2+5x \\ & \quad + \quad - \\ \hline & \quad 9x-3 \\ & \quad 9x-\frac{9}{2} \\ & \quad - \quad + \\ \hline & \quad \frac{3}{2} \end{array}$$

So the remainder by actual division is $\frac{3}{2}$

Factorisation of Polynomials Ex 6.3 Q5

Answer :

Let us denote the given polynomials as

$$f(x) = x^3 - 6x^2 + 2x - 4,$$
$$g(x) = 1 - 2x$$
$$\Rightarrow \quad g(x) = -2\left(x - \frac{1}{2}\right)$$

We have to find the remainder when $f(x)$ is divided by $g(x)$.

By the remainder theorem, when $f(x)$ is divided by $g(x)$ the remainder is

$$f\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^3 - 6\left(\frac{1}{2}\right)^2 + 2\left(\frac{1}{2}\right) - 4$$
$$= \frac{1}{8} - 6 \times \frac{1}{4} + 2 \times \frac{1}{2} - 4$$
$$= \frac{1}{8} - \frac{3}{2} + 1 - 4$$
$$= \frac{1}{8} - \frac{3}{2} - 3$$
$$= \boxed{-\frac{35}{8}}$$

Now we will calculate remainder by actual division

$$
\begin{array}{r}
-x^2+\frac{11}{4}x+\frac{3}{2} \\
\hline
-2x+1\,\big)\,x^3-6x^2+2x-4 \\
x^3-\frac{1}{2}x^2 \\
-\quad+ \\
\hline
-\frac{11}{2}x^2+2x-4 \\
-\frac{11}{2}x^2+\frac{11}{4}x \\
+\quad\quad- \\
\hline
-\frac{3}{4}x-4 \\
-\frac{3}{4}x^2+\frac{3}{8}x \\
+\quad\quad- \\
\hline
-\frac{35}{8}
\end{array}
$$

So the remainder is $\frac{-35}{8}$

********** END **********