## Polynomials Ex 2.3 Q3

**Answer :**

We know that, if $x=\alpha$ is a zero of a polynomial, and then $x-\alpha$ is a factor of $f(x)$.

Since $-2$ and $-1$ are zeros of $f(x)$.

Therefore

$$(x+2)(x+1)=x^2+2x+x+2$$
$$=x^2+3x+2$$

$x^2+3x+2$ is a factor of $f(x)$.Now, We divide $2x^4+x^3-14x^2-19x-6$ by $g(x)=x^2+3x+2$ to find the other zeros of $f(x)$.

$$\begin{array}{r|l}
 & 2x^2+5x-3 \\
x^2+3x+2 & \cancel{+2x^4}+x^3-14x^2-19x-6 \\
 & +\cancel{2x^4}+6x^3+4x^2 \\
 & \underline{-\quad\;\;-\quad\;\;-} \\
 & -\cancel{5x^3}-18x^2-19x \\
 & -\cancel{5x^3}-15x^2-10x \\
 & \underline{+\quad\;\;+\quad\;\;+} \\
 & -\cancel{3x^2}-\cancel{9x}-\cancel{6} \\
 & -\cancel{3x^2}-\cancel{9x}-\cancel{6} \\
 & \underline{+\quad\;\;+\quad\;\;+} \\
 & 0
\end{array}$$

By using division algorithm we have, $f(x)=g(x)\times q(x)-r(x)$

$$2x^4+x^3-14x^2-19-6=(x^2+3x+2)(2x^2-5x-3)$$
$$2x^4+x^3-14x^2-19-6=(x^2+2x+1x+2)(2x^2-6x+1x-3)$$
$$2x^4+x^3-14x^2-19-6=[x(x+2)+1(x+2)][2x(x-3)+1(x-3)]$$
$$2x^4+x^3-14x^2-19-6=[(x+1)(x+2)(2x+1)(x-3)]$$

Hence, the zeros of the given polynomials are $\boxed{-1,\ -2,\ \frac{-1}{2}\text{ and }3}$.

## Polynomials Ex 2.3 Q4

**Answer :**

Since $-2$ is one zero of $f(x)$.

Therefore, we know that, if $x=\alpha$ is a zero of a polynomial, then $(x-\alpha)$ is a factor of $f(x)=x+2$ is a factor of $f(x)$.

Now, we divide $f(x)=x^3+13x^2+32x+20$ by $g(x)=(x+2)$ to find the others zeros of $f(x)$.

$$\begin{array}{r|l}
 & x^2-11x+10 \\
x+2 & +\cancel{x^3}+13x^2+32x+20 \\
 & \underline{+\cancel{x^3}+2x^2} \\
 & +\cancel{11x^2}+32x \\
 & \underline{+\cancel{11x^2}+22x} \\
 & +\cancel{10x}+\cancel{20} \\
 & \underline{+\cancel{10x}+\cancel{20}} \\
 & 0
\end{array}$$

By using that division algorithm we have, $f(x) = g(x) \times q(x) + r(x)$

$$x^3 + 13x^2 + 32x + 20 = (x+2)(x^2 + 11x + 10) + 0$$

$$x^3 + 13x^2 + 32x + 20 = (x+2)(x^2 + 10x + 1x + 10)$$

$$x^3 + 13x^2 + 32x + 20 = (x+2)[x(x+10) + 1(x+10)]$$

$$x^3 + 13x^2 + 32x + 20 = (x+2)(x+1)(x+10)$$

Hence, the zeros of the given polynomials are $\boxed{-2, -1, \text{ and } -10}$.

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