3.1 WS

KEY

Use long division to divide the polynomial.

1. $\dfrac{5x^3+6x^2-17x+20}{x+3}$

$$
\begin{array}{r}
5x^2-9x+10 \\
x+3\ \overline{)\ 5x^3+6x^2-17x+20} \\
-5x^3\mp 15x^2 \\
\hline
-9x^2-17x+20 \\
+9x^2+27x \\
\hline
10x+20 \\
-10x\mp 30 \\
\hline
-10
\end{array}
$$

$$5x^2-9x+10+\frac{-10}{x+3}$$

2. $\dfrac{6x^3+15x^2-8x+2}{x+4}$

$$
\begin{array}{r}
6x^2-9x+28 \\
x+4\ \overline{)\ 6x^3+15x^2-8x+2} \\
-6x^3\mp 24x^2 \\
\hline
-9x^2-8x+2 \\
+9x^2+36x \\
\hline
28x+2 \\
-28x\mp 112 \\
\hline
-110
\end{array}
$$

$$6x^2-9x+28+\frac{-110}{x+4}$$

3. $\dfrac{x^4-5x^2+3x-1}{x-2}$

$$
\begin{array}{r}
x^3+2x^2-x+1 \\
x-2\ \overline{)\ x^4+0x^3-5x^2+3x-1} \\
x^4+2x^3 \\
\hline
2x^3-5x^2+3x-1 \\
-2x^3+4x^2 \\
\hline
-x^2+3x-1 \\
+x^2\mp 2x \\
\hline
x-1 \\
-x+2 \\
\hline
1
\end{array}
$$

$$x^3+2x^2-x+1+\frac{1}{x-2}$$

4. $\dfrac{2x^4+5x^3-6x^2+4x+3}{2x^2-x+1}$

$$
\begin{array}{r}
x^2+3x-2 \\
2x^2-x+1\ \overline{)\ 2x^4+5x^3-6x^2+4x+3} \\
-2x^4+x^3\mp x^2 \\
\hline
6x^3-7x^2+4x+3 \\
-6x^3+3x^2\mp 3x \\
\hline
-4x^2+x+3 \\
+4x^2\mp 2x+2 \\
\hline
-x+5
\end{array}
$$

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

Use synthetic division to divide the polynomial.

5. $\dfrac{4x^3-5x^2+6x-7}{x-2}$

2 | 4 -5 6 -7
↓ 8 6 24
4 3 12 17

$4x^2+3x+12+\dfrac{17}{x-2}$

6. $\dfrac{4x^3-2x+3}{x+1}$

-1 | 4 0 -2 3
↓ -4 4 -2
4 -4 2 1

$4x^2-4x+2+\dfrac{1}{x+1}$

7. $\dfrac{-10x^3+5x+x^5-1}{x-4}$

4 | 1 0 -10 0 5 -1
↓ 4 16 24 96 404
1 4 6 24 101 403

$x^4+4x^3+6x^2+24x+101+\dfrac{403}{x-4}$

Use synthetic division to determine whether the binomial is a factor of $P(x)$.

8. $P(x)=x^3+2x^2-5x-6,\ x-2$

2 | 1 2 -5 -6
↓ 2 8 6
1 4 3 (0)

yes

9. $P(x)=2x^3+x^2-3x-1,\ x+1$

-1 | 2 1 -3 -1
-2 1 2
2 -1 -2 (1)

No

10. $P(x)=x^4+x^3-2x^2+5x-140,\ x+4$

-4 | 1 1 -2 5 -140
-4 12 -40 140
1 -3 10 -35 [0]

yes