3.1 WS 2

KEY

Use long division to divide the polynomial.

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

$$x-1 \;\overline{)\; x^4-5x^3+0x^2+x-4 \;}\;\; x^3-4x^2-4x-3$$

$-x^4+x^3$

$-4x^3+0x^2+x-4$

$+4x^3\mp 4x^2$

$-4x^2+x-4$

$+4x^2\mp 4x$

$-3x-4$

$+3x\mp 3$

-7

$$x^3-4x^2-4x-3+\frac{-7}{x-1}$$

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

$$x^2-2x+2 \;\overline{)\; 3x^3+x^2-5x+2 \;}\;\; 3x+7$$

$-3x^3+6x^2\mp 6x$

$7x^2-11x+2$

$-7x^2+14x\mp 14$

$3x-12$

$$3x+7+\frac{3x-12}{x^2-2x+2}$$

3. $\dfrac{-5x^2-8x+x^4+3}{x-3}$

$$x-3 \;\overline{)\; x^4+0x^3-5x^2-8x+3 \;}\;\; x^3+3x^2+4x+4$$

$-x^4+3x^3$

$3x^3-5x^2-8x+3$

$-3x^3+9x^2$

$4x^2-8x+3$

$-4x^2+12x$

$4x+3$

$-4x+12$

15

$$x^3+3x^2+4x+4+\frac{15}{x-3}$$

4. $\dfrac{3x^4-2x^3-7x^2+x^5-x+4}{x^2+1}$

$$x^2+1 \;\overline{)\; x^5+3x^4-2x^3-7x^2-x+4 \;}\;\; x^3+3x^2-3x-10$$

$-x^5\mp 0x^4+\mp x^3$

$3x^4-3x^3-7x^2-x+4$

$-3x^4+0x^3+\mp 3x^2$

$-3x^3-10x^2-x+4$

$+3x^3\mp 0x^2+3x$

$-10x^2+2x+4$

$+10x^2\mp 0x+10$

$2x+14$

$$x^3+3x^2-3x-10+\frac{2x+14}{x^2+1}$$

Use synthetic division to divide the polynomial.

5. $\dfrac{5x^3+6x^2-8x+1}{x-5}$

$5 \mid 5 \;\; 6 \;\; -8 \;\; 1$

$\downarrow \;\; 25 \;\; 155 \;\; 735$

$5 \;\; 31 \;\; 147 \;\; 736$

$5x^2+31x+147+\dfrac{736}{x-5}$

6. $\dfrac{-4x^2+6x^3+17}{x+3}$

$-3 \mid 6 \;\; -4 \;\; 0 \;\; 17$

$\quad\quad -18 \;\; 66 \;\; -198$

$6 \;\; -22 \;\; 66 \;\; -181$

$6x^2-22x+66-\dfrac{181}{x+3}$

7. $\dfrac{-4x^2+8x^3+6x-3}{x-\frac{1}{2}}$

$\frac{1}{2} \mid 8 \;\; -4 \;\; 6 \;\; -3$

$\quad\quad\quad 4 \;\; 0 \;\; 3$

$8 \;\; 0 \;\; 6 \;\; 0$

$8x^2+6$

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

8. $P(x)=x^3+4x^2-27x-90,\ x+6$

$-6 \mid 1 \;\; 4 \;\; -27 \;\; -90$

$\quad\quad -6 \;\; 12 \;\; 90$

$1 \;\; -2 \;\; -15 \;\; 0$

yes

9. $P(x)=2x^3-8x^2-5x+33,\ x-3$

$3 \mid 2 \;\; -8 \;\; -5 \;\; 33$

$\quad\quad 6 \;\; -6 \;\; -33$

$2 \;\; -2 \;\; -11 \;\; 0$

yes

10. $P(x)=x^4-12x^2+36,\ x-3$

$3 \mid 1 \;\; 0 \;\; -12 \;\; 0 \;\; 36$

$\quad\quad 3 \;\; 9 \;\; -9 \;\; -27$

$1 \;\; 3 \;\; -3 \;\; -9 \;\; 9$

No