

3. $(6x^3 + 7x^2 + 12x - 5) \div (3x - 1)$

$$\begin{array}{r}
 2x^2 + 3x + 5 \\
 3x-1 \overline{) 6x^3 + 7x^2 + 12x - 5} \\
 \underline{6x^3 - 2x^2} \\
 9x^2 + 12x - 5 \\
 \underline{9x^2 - 3x} \\
 15x - 5 \\
 \underline{15x - 5} \\
 0
 \end{array}$$

$2x^2 + 3x + 5$

5. $\frac{18x^4 + 9x^3 + 3x^2}{3x^2 + 1}$

$$\begin{array}{r}
 6x^2 + 3x - 1 + \frac{(-3x+1)}{3x^2+1} \\
 3x^2+1 \overline{) 18x^4 + 9x^3 + 3x^2 + 0x + 0} \\
 \underline{18x^4 + 6x^2} \\
 9x^3 - 3x^2 + 0x + 0 \\
 \underline{9x^3 + 3x} \\
 -3x^2 - 3x + 0 \\
 \underline{-3x^2 - 1} \\
 -3x + 1
 \end{array}$$

8. $(x^2 - 5x - 5x^3 + x^4) \div (5 + x)$

$$\begin{array}{r}
 -5 \overline{) 1 \quad -5 \quad 1 \quad -5 \quad 0} \\
 \underline{-5 \quad 50 \quad -255 \quad 1300} \\
 1 \quad -10 \quad 51 \quad -260 \quad \boxed{1300} \\
 \hline
 x^3 - 10x^2 + 51x - 260 + \frac{1300}{x+5}
 \end{array}$$

$$\boxed{x^3 - 10x^2 + 51x - 260 + \frac{1300}{x+5}}$$

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

$$\begin{array}{r} 2 \overline{) 1 \quad -2 \quad -1 \quad 3 \quad -1 \quad 1} \\ \underline{2 \quad 0 \quad -2 \quad 2 \quad 2} \\ 1 \quad 0 \quad -1 \quad 1 \quad 1 \quad \boxed{3} \end{array}$$

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

12. $f(x) = x^3 - 7x^2 + 5x - 6$; $f(3)$

$$\begin{array}{r} 3 \overline{) 1 \quad -7 \quad 5 \quad -6} \\ \underline{3 \quad -12 \quad -21} \\ 1 \quad -4 \quad -7 \quad \boxed{-27} \end{array}$$

$$\boxed{f(3) = -27}$$

17. Solve the equation $2x^3 - 5x^2 + x + 2 = 0$ given that 2 is a zero of $f(x) = 2x^3 - 5x^2 + x + 2$.

$$\begin{array}{r} 2 \overline{) 2 \quad -5 \quad 1 \quad 2} \\ \underline{4 \quad -2 \quad -2} \\ 2 \quad -1 \quad -1 \quad \boxed{0} \end{array}$$

$$2x^3 - 5x^2 + x + 2 = (x-2)(2x^2 - x - 1)$$

$$(2x+1)(x-1)$$

$$\boxed{x = 2, -\frac{1}{2}, 1}$$

Factor Completely

19. $8p^3 - q^3 = (2p - q)(4p^2 + 2pq + q^2)$

20. $3x^{12} + 48x^7 - 51x^2 = 3x^2(x^{10} + 16x^5 - 17) = 3x^2(x^5 + 17x^5 - 1)$

Solve Completely

21. $16x^4 - 2x = 0$

22. $10x^4 - 10 = 0$

21. $2x(8x^3 - 1) = 0$
 $2x(2x - 1)(4x^2 + 2x + 1) = 0$

$$10x - 10 = 0$$

$$(21) \quad 2x(8x^3 - 1) = 0$$

$$2x(2x - 1)(4x^2 + 2x + 1) = 0$$

$$\boxed{x=0 \quad x=\frac{1}{2}}$$

$$x = \frac{-2 \pm \sqrt{4 - 4(4)(1)}}{2(4)}$$

$$x = \frac{-2 \pm \sqrt{-12}}{8} = \frac{-2 \pm 2i\sqrt{3}}{8}$$

$$\boxed{x = \frac{-1 \pm i\sqrt{3}}{4}}$$

$$(22) \quad 10(x^4 - 1) = 0$$

$$10(x^2 - 1)(x^2 + 1) = 0$$

$$10 \neq 0 \quad x^2 - 1 = 0 \quad x^2 + 1 = 0$$

$$x^2 = 1 \quad x^2 = -1$$

$$\boxed{x = \pm 1 \quad x = \pm i}$$