

$$1. (3a^3 + 5a^2 - 4) \div (3a)$$

$$\frac{3a^3 + 5a^2 - 4}{3a}$$

$$\frac{3a^3}{3a} + \frac{5a^2}{3a} - \frac{4}{3a}$$

$$a^2 + \frac{5}{3}a - \frac{4}{3a}$$

$$2. (\frac{2}{3}a^2b^2 - \frac{1}{4}a^2b^4 + \frac{5}{6}ab^4 - \frac{2}{5}b^5) \div (-\frac{1}{2}ab^2)$$

$$\frac{\frac{2}{3}a^2b^2}{-\frac{1}{2}ab^2} - \frac{\frac{1}{4}a^2b^4}{-\frac{1}{2}ab^2} + \frac{\frac{5}{6}ab^4}{-\frac{1}{2}ab^2} - \frac{\frac{2}{5}b^5}{-\frac{1}{2}ab^2}$$

$$-\frac{4}{3}ab^0 + \frac{2}{4}ab^2 - \frac{10}{6}a^0b^2 + \frac{4}{5}ab^3$$

$$-\frac{4}{3}a + \frac{2}{4}ab^2 - \frac{10}{6}b^2 + \frac{4}{5}ab^3$$

$$3. (x^4 - 2x^3 - 11x^2 + 30x - 20) \div (x^2 + 3x - 2)$$

$$\begin{array}{r} x^2 - 5x + 6 \\ x^2 + 3x - 2 \overline{) x^4 - 2x^3 - 11x^2 + 30x - 20} \\ \underline{-4x^4 - 3x^3 + 2x^2} \end{array}$$

$$-5x^3 - 9x^2 + 30x$$

$$+ 5x^3 + 15x^2 - 10x$$

$$6x^2 + 20x - 20$$

$$-6x^2 - 18x + 12x$$

$$2x - 8$$

$$R = x^2 - 5x + 6 \left(\frac{2x - 8}{x^2 + 3x - 2} \right)$$

$$4. (x^6 + 5x^4 + 3x^2 - 2x) \div (x^2 - x + 3)$$

$$\begin{array}{r} x^4 + x^3 + 3x^2 - 3 \\ x^2 - x + 3 \overline{) x^6 + 5x^4 + 3x^2 - 2x} \\ \underline{-x^6 + x^5 - 3x^4} \end{array}$$

$$x^5 + 2x^4$$

$$x^5 + x^4 - 3x^3 + 6x^2$$

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

$$-3x^4 + 3x^3 - 6x^2$$

$$3x^2 - 2x$$

$$3x^2 = 3x + 9$$

$$1x + 9$$

$$R = x^4 + x^3 + 3x^2 - 3 + \frac{1x + 9}{x^2 - x + 3}$$

$$5. (x^4 - 2x^3 - 11x^2 + 30x - 20) \div (x^2 + 3x - 2)$$

$$\begin{array}{r} x^2 - 5x + 6 \\ x^2 + 3x - 2 \overline{) x^4 - 2x^3 - 11x^2 + 30x - 20} \\ \underline{-x^4 + 3x^3 + 2x^2} \\ 5x^3 - 9x^2 + 30x \\ \underline{-5x^3 + 15x^2 - 10x} \\ 6x^2 + 20x - 20 \\ \underline{-6x^2 - 18x + 12} \\ 2x - 8 \end{array}$$

$$R = x^2 - 5x + 6 \left(\frac{2x - 8}{x^2 + 3x - 2} \right)$$

$$6. (x^6 + 5x^4 + 3x^2 - 2x) \div (x^2 - x + 3)$$

$$\begin{array}{r} x^4 + x^3 + 3x^2 + 6x - 20 \\ x^2 - x + 3 \overline{) x^6 + 5x^4 + 3x^2 - 2x} \\ \underline{-x^6 + x^5 - 3x^4} \\ x^5 + 2x^4 \\ \underline{-x^5 + x^4 + 3x^3} \\ 3x^4 + 3x^3 + 3x^2 \\ \underline{-3x^4 + 3x^3 - 9x^2} \\ 6x^3 - 6x^2 - 2x \\ \underline{-6x^3 + 6x^2 - 18x} \\ -20x \\ \underline{+20x + 20} \\ -20x^2 + 20 \end{array}$$

$$R = x^4 + x^3 + 3x^2 + 6x - 20 \left(\frac{-20x^2 + 20}{x^2 - x + 3} \right)$$

$$7. (2x^4 - 2x^3 + 3x^2 + 5x + 10) \div (x + 2)$$

$$\begin{array}{r} 2x^3 + 6x^2 - 9x + 23 \\ x + 2 \overline{) 2x^4 - 2x^3 + 3x^2 + 5x + 10} \\ \underline{2x^4 + 4x^3} \\ -6x^3 + 3x^2 \\ \underline{+6x^3 + 3x^2} \\ -6x^3 - 12x^2 \\ \underline{+9x^2 + 5x} \\ +9x^2 + 18x \\ \underline{-23x + 10} \\ -23x - 43 \end{array}$$

$$R = 2x^3 + 6x^2 - 9x + 23 \left(\frac{-33}{x + 2} \right)$$

$$8-x+2 \mid x^{10} - 1024$$

$$x^9 - 2x^8 + 4x^7 - 8x^6 + 16x^5 + 32x^4 - 64x^3 + 128x^2 - 256x + 512$$

$$x+2 \mid \begin{array}{l} x^{10} \\ 0x^9 \\ 0x^8 \\ 0x^7 \\ 0x^6 \\ 0x^5 \\ 0x^4 \\ 0x^3 \\ 0x^2 \\ 0x \\ +1024 \end{array}$$

$$\underline{-x^{10} - 2x^9}$$

$$2x^9 + 0x^8$$

$$\underline{2x^9 + 4x^8}$$

$$4x^8 + 0x^7$$

$$\underline{4x^8 - 8x^7}$$

$$-8x^7 + 0x^6$$

$$\underline{8x^7 + 16x^6}$$

$$16x^6 + 0x^5$$

$$\underline{-16x^6 + 32x^5}$$

$$32x^5 + 0x^4$$

$$\underline{32x^5 - 64x^4}$$

$$-64x^4 + 0x^3$$

$$\underline{64x^4 + 128x^3}$$

$$128x^3 + 0x^2$$

$$\underline{128x^3 - 256x^2}$$

$$-256x^2 + 0x$$

$$\underline{256x^2 + 512x}$$

$$512x + 1024$$

$$\underline{512x - 1024}$$

==

$$9. - (x^3 - 5x - 1) \div (x - 3)$$

$$\begin{array}{r} x^2 + 3x + 4 \\ x-3 \overline{) x^3 - 1} \\ \underline{x^3 + 3x^2} \\ 3x^2 - 5x \\ \underline{-3x^2 + 9x} \\ 4x - 1 \\ \underline{-4x + 12} \\ 11 \end{array}$$

$$R = x^2 + 3x + 4 \left(\frac{11}{x-3} \right)$$

$$10. (R^4 S^3 T^2 U)^5$$

$$(R^4 S^3 T^2 U) (R^4 S^3 T^2 U)$$

$$R^8 S^6 T^4 U^2 (R^4 S^3 T^2 U)$$

$$R^{12} S^9 T^6 U^3 (R^4 S^3 T^2 U)$$

$$R^{20} S^{15} T^{10} U^5$$

$$R = R^{20} S^{15} T^{10} U^5$$

$$11. (a^3 b^4 c^2 d^5)^6 (-a^3 b^4 c^2 d^5)$$

$$a^6 b^8 c^4 d^{10} (-a^3 b^4 c^2 d^5)$$

$$-a^9 b^{12} c^6 d^{15} (-a^3 b^4 c^2 d^5)$$

$$a^{12} b^{16} c^8 d^{20} (-a^3 b^4 c^2 d^5)$$

$$a^{15} b^{20} c^{10} d^{25} (-a^3 b^4 c^2 d^5)$$

$$-a^{18} b^{24} c^{12} d^{30}$$

$$R = -a^{18} b^{24} c^{12} d^{30}$$

$$12. (-3x^6 y^3 z^2) (-3x^6 y^3 z^2)$$

$$9x^{12} y^6 z^4$$

$$13. \left(\frac{2}{5} a^4 b - \frac{4}{3} ab - 4 \right) \left(\frac{3}{2} a b^2 \right)$$

$$\frac{3}{10} a^3 b^3 - \frac{12}{9} a^2 b^3 - \frac{12}{4} a b^2$$

$$14. - (3x^3 + 2y^2) (3x^3 + 2y^2)^2$$

$$\begin{array}{r} 9x^6 + 6x^3y^2 \\ 6x^3y^2 + 4y^4 \\ \hline 9x^6 + 12x^3y^2 + 4y^4 \end{array} (3x^3 + 2y^2)$$

$$\begin{array}{r} 27x^8 + 36x^5y^2 + 12x^2y^4 \\ 18x^6y^2 + 24^3y^2 + 8y^6 \\ \hline 27x^8 + 36x^5y^2 + 12x^2y^4 + 18x^6y^2 + 24^3y^2 + 8y^6 \end{array}$$

$$R = 27x^8 + 18x^6y^2 + 36x^5y^2 + 24x^3y^2 + 12x^2y^4 + 8y^6$$

$$15. - \left(\frac{2}{6}a^6 + \frac{1}{3}b^2 \right) \left(\frac{2}{6}a^3 + \frac{1}{3}b^2 \right)$$

$$\frac{2}{18} + \frac{2}{18} = \frac{6+6}{6} = 1$$

$$\frac{4}{36}a^6 + \frac{2}{18}a^3b^2$$

$$\frac{2}{18}a^3b^2 + \frac{1}{9}b^4$$

$$\frac{4}{36}a^6 + 1a^3b^2 + \frac{1}{9}b^4$$