

$$\begin{aligned}
 1. \quad & [(3x - 1)(3x + 1)]^2 - \left(9x^2 - \frac{1}{2}\right)^2 + \frac{1}{4} \\
 & = (9x^2 - 1)^2 - \left(81x^4 - 9x^2 + \frac{1}{4}\right) + \frac{1}{4} = \\
 & = 81x^4 - 18x^2 + 1 - 81x^4 + 9x^2 - \frac{1}{4} + \frac{1}{4} = \mathbf{1 - 9x^2}
 \end{aligned}$$

$$\begin{aligned}
 2. \quad & (2x - 5y)(2x + 5y) + (x - 3y)^2 + (x + 4y)(-x + 4y) \\
 & = 4x^2 - 25y^2 + x^2 - 6xy + 9y^2 - x^2 + 16y^2 = \mathbf{4x^2 - 6xy}
 \end{aligned}$$

$$\begin{aligned}
 3. \quad & 5x \left(1 + \frac{1}{4}x\right) + (x^2 + x - 1)^2 - (x + 1)^3 - x^2 \left(x + \frac{1}{2}\right) \\
 & = 5x + \frac{5}{4}x^2 + x^4 + x^2 + 1 + 2x^3 - 2x^2 - 2x - (x^3 + 3x^2 + 3x + 1) - x^3 - \frac{1}{2}x^2 = \\
 & = 5x + \frac{5}{4}x^2 + x^4 + x^2 + 1 + 2x^3 - 2x^2 - 2x - x^3 - 3x^2 - 3x - 1 - x^3 - \frac{1}{2}x^2 = \mathbf{x^4 - \frac{13}{4}x^2}
 \end{aligned}$$

$$\begin{aligned}
 4. \quad & (a + b)(a - b) - (a - b)^2 - 2b(a - b) \\
 & = a^2 - b^2 - (a^2 - 2ab + b^2) - 2ab + 2b^2 = \\
 & = a^2 - b^2 - a^2 + 2ab - b^2 - 2ab + 2b^2 = \mathbf{0}
 \end{aligned}$$

$$\begin{aligned}
 5. \quad & [(x - y)^2 + (x + y)^2](2x^2 - 2y^2) + 8y^2(x^2 + y^2) - (2x^2 + 2y^2)^2 \\
 & = (x^2 - 2xy + y^2 + x^2 + 2xy + y^2)(2x^2 - 2y^2) + 8x^2y^2 + 8y^4 - (4x^4 + 8x^2y^2 + 4y^4) = \\
 & = (2x^2 + 2y^2)(2x^2 - 2y^2) + 8x^2y^2 + 8y^4 - 4x^4 - 8x^2y^2 - 4y^4 = \\
 & = 4x^4 - 4y^4 + 4y^4 - 4x^4 = \mathbf{0}
 \end{aligned}$$

$$\begin{aligned}
 6. \quad & \{(2a + 3b)(2b - 3a) - 6[(b + a)(b - a) - ab]\} \cdot [(a + b)^2 - (a^2 + b^2)] \\
 & = \{4ab - 6a^2 + 6b^2 - 9ab - 6(b^2 - a^2 - ab)\} \cdot (a^2 + 2ab + b^2 - a^2 - b^2) = \\
 & = (-6a^2 + 6b^2 - 5ab - 6b^2 + 6a^2 + 6ab) \cdot (2ab) = \\
 & = (ab) \cdot (2ab) = \mathbf{2a^2b^2}
 \end{aligned}$$

$$\begin{aligned} 7. & \{[a^3 - b^3 + (a + b)^3 + 2a^2b - a(2a + 3b)(a + b)]^2 - 1\}^3 \\ &= \{[a^3 - b^3 + a^3 + 3a^2b + 3ab^2 + b^3 + 2a^2b - a(2a^2 + 2ab + 3ab + 3b^2)]^2 - 1\}^3 = \\ &= \{[a^3 + a^3 + 5a^2b + 3ab^2 - 2a^3 - 2a^2b - 3a^2b - 3ab^2]^2 - 1\}^3 = \\ &= \{(0)^2 - 1\}^3 = (-1)^3 = \mathbf{-1} \end{aligned}$$

Esegui la seguente divisione applicando la regola di Ruffini:

$$(2a^4 - 5a^3 + 6a^2 - 7a + 1) : (a - 2)$$

$$Q(x) = 2a^3 - a^2 + 4a + 1$$

$$R(x) = 3$$

$$\begin{array}{r|rrrr|r} & 2 & -5 & 6 & -7 & 1 \\ 2 & & 4 & -2 & 8 & 2 \\ \hline & 2 & -1 & 4 & 1 & 3 \end{array}$$