

1.
$$\left[\left(2ab - \frac{1}{2}b^2 \right) (3a + 2b) \left(-\frac{1}{3}b \right) - \frac{1}{3}b^4 + \frac{5}{6}ab^3 \right] : \left(\frac{1}{3}a^2b^2 \right)$$

$$= \left[\left(6a^2b + 4ab^2 - \frac{3}{2}ab^2 - b^3 \right) \left(-\frac{1}{3}b \right) - \frac{1}{3}b^4 + \frac{5}{6}ab^3 \right] : \left(\frac{1}{3}a^2b^2 \right) =$$

$$= \left[-2a^2b^2 - \frac{4}{3}ab^3 + \frac{1}{2}ab^3 + \frac{1}{3}b^4 - \frac{1}{3}b^4 + \frac{5}{6}ab^3 \right] : \left(\frac{1}{3}a^2b^2 \right) =$$

$$= (-2a^2b^2) : \left(\frac{1}{3}a^2b^2 \right) = \mathbf{-6}$$
2.
$$\left(\frac{1}{2}a^2b - a \right) \left(\frac{1}{2}a^2b + a \right) : \left(\frac{1}{2}a \right) \left(\frac{1}{2}a^2b^2 + 2 \right) \left(3a - \frac{5}{2}a + \frac{1}{2}a \right) + 4a^2$$

$$= \left(\frac{1}{4}a^4b^2 - a^2 \right) : \left(\frac{1}{2}a \right) \left(\frac{1}{2}a^2b^2 + 2 \right) (a) + 4a^2 =$$

$$= \left(\frac{1}{2}a^3b^2 - 2a \right) \left(\frac{1}{2}a^2b^2 + 2 \right) a + 4a^2 = \left(\frac{1}{4}a^5b^4 - 4a \right) a + 4a^2 =$$

$$= \frac{1}{4}a^6b^4 - 4a^2 + 4a^2 = \mathbf{\frac{1}{4}a^6b^4}$$
3.
$$\left(4a^3 - \frac{1}{2}a^2 \right) \left(\frac{1}{2}a + 4 \right) + 2a(-a^3 + a)$$

$$= 2a^4 + 16a^3 - \frac{1}{4}a^3 - 2a^2 - 2a^4 + 2a^2 = \mathbf{\frac{63}{4}a^3}$$
4.
$$(x - y)(2x - 1) - x(2x - 1) - y(1 + 2x)$$

$$= 2x^2 - x - 2xy + y - 2x^2 + x - y - 2xy = \mathbf{-4xy}$$
5.
$$[3a(a^2 - 1) - 2a(2a - 1)] : 2a$$

$$= [3a^3 - 3a - 4a^2 + 2a] : 2a = (3a^3 - a - 4a^2) : 2a = \mathbf{\frac{3}{2}a^2 - \frac{1}{2} - 2a}$$
6.
$$-\frac{1}{2}xy \left[\left(\frac{3}{4}x^2y^2 + \frac{1}{2}x^2y^2 \right) : (-2x^2) \right] + \frac{7}{8}xy^3 = -\frac{1}{2}xy \left[\left(\frac{5}{4}x^2y^2 \right) : (-2x^2) \right] + \frac{7}{8}xy^3 =$$

$$= -\frac{1}{2}xy \left(-\frac{5}{8}y^2 \right) + \frac{7}{8}xy^3 = \frac{5}{16}xy^3 + \frac{7}{8}xy^3 = \mathbf{\frac{19}{16}xy^3}$$
7.
$$(2x - 1)^2 - (1 + 2x)(1 - 2x) - 4x(2x - 1)$$

$$= 4x^2 - 4x + 1 - (1 - 4x^2) - 8x^2 + 4x = 4x^2 - 4x + 1 - 1 + 4x^2 - 8x^2 + 4x = \mathbf{0}$$

8. $(x-1)^3 - (x+1)^2 - (x+1)(-x+1) - (x^2+1)(x-3)$
 $= x^3 - 3x^2 + 3x - 1 - (x^2 + 2x + 1) - (1 - x^2) - (x^3 - 3x^2 + x - 3) =$
 $= x^3 - 3x^2 + 3x - 1 - x^2 - 2x - 1 - 1 + x^2 - x^3 + 3x^2 - x + 3 = 0$
9. $(x-3)(x-2) + (x+3)(x-2) - 2(x-3)(x+2) - 12$
 $= x^2 - 5x + 6 + x^2 + x - 6 - 2(x^2 - x - 6) - 12 =$
 $= x^2 - 5x + 6 + x^2 + x - 6 - 2x^2 + 2x + 12 - 12 = -2x$
10. $[(x-2)(x+2) - (x-1)^3 - 4x^2]^2 - (x^3-3)^2 - 6x(x^3+2x+3) + 3x^2$
 $= [x^2 - 4 - (x^3 - 3x^2 + 3x - 1) - 4x^2]^2 - (x^6 - 6x^3 + 9) - 6x^4 - 12x^2 - 18x + 3x^2 =$
 $= [x^2 - 4 - x^3 + 3x^2 - 3x + 1 - 4x^2]^2 - x^6 + 6x^3 - 9 - 6x^4 - 12x^2 - 18x + 3x^2 =$
 $= (-3 - x^3 - 3x)^2 - x^6 + 6x^3 - 9 - 6x^4 - 9x^2 - 18x =$
 $= 9 + x^6 + 9x^2 + 6x^3 + 18x + 6x^4 - x^6 + 6x^3 - 9 - 6x^4 - 9x^2 - 18x = 12x^3$