

$$1. a^2x^2 - 4abx^2 + 4b^2x^2 + 2a^2 - 8ab + 8b^2$$

$$= x^2(a^2 - 4ab + 4b^2) + 2(a^2 - 4ab + 4b^2) = (a^2 - 4ab + 4b^2)(x^2 + 2) = (a - 2b)^2(x^2 + 2)$$

$$2. -a^3 + \frac{4}{3}a^2 - \frac{4}{9}a$$

$$= -a\left(a^2 - \frac{4}{3}a + \frac{4}{9}\right) = -a\left(a - \frac{2}{3}\right)^2$$

$$3. x^3 - 3x^2 + 3x - 1 - ax^2 + a$$

$$= (x - 1)^3 - a(x^2 - 1) = (x - 1)^3 - a(x - 1)(x + 1) = (x - 1)[(x - 1)^2 - a(x + 1)] = \\ = (x - 1)(x^2 - 2x + 1 - ax - a)$$

$$4. x^4 - a^2x^2 - 4x^2 + 4a^2$$

$$= x^2(x^2 - 4) - a^2(x^2 - 4) = (x^2 - 4)(x^2 - a^2) = (x - 2)(x + 2)(x - a)(x + a)$$

$$5. xy^4 - 2xy^2 + x$$

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

$$6. x(a - 2)^2 - x(3a - 2)^2$$

$$= x[(a - 2)^2 - (3a - 2)^2] = x(a - 2 + 3a - 2)(a - 2 - 3a + 2) = -2ax(4a - 4) = -8ax(a - 1)$$

$$7. a^5 - 3a^4 + 3a^3 - a^2$$

$$= a^2(a^3 - 3a^2 + 3a - 1) = a^2(a - 1)^3$$