問題 **2.8.** 次の式を因数分解しなさい.

(1) $x^2yz^2 - xy^2z^3 = xyz^2(x - yz)$

(2) $2x(x - 3y) - y(3y - x) = (2x + y)(x - 3y)$

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

(4) $x^2 - x + \dfrac{1}{4} = \left(x - \dfrac{1}{2}\right)^2$

(5) $49x^2 - 25y^2 = (7x + 5y)(7x - 5y)$

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

(7) $6x^2 + 5x - 14 = (x + 2)(6x - 7)$

(8) $x^6 - y^6 = (x + y)(x^2 - xy + y^2)(x - y)(x^2 + xy + y^2)$

問題 **2.9.** 次の分数式を約分して既約分数式にしなさい.

(1) $\dfrac{4x^3 + 8xy^2}{12x^2} = \dfrac{x^2 + 2y^2}{3x}$

(2) $\dfrac{2x - 4}{2x^2 - 3x - 2} = \dfrac{2}{2x + 1}$

(3) $\dfrac{x^2 - (y + z)^2}{(x + y)^2 - z^2} = \dfrac{x - y - z}{x + y - z}$

問題 **2.10.** 次の式 $f(x)$ を因数分解しなさい.

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

(2) $f(x) = x^8 - 8x + 8 = (x - 2)(x^2 + 2x - 4)$ [*1]

(3) $f(x) = 2x^3 + 3x^2 - 8x + 3 = (x - 1)(x + 3)(2x - 1)$

(4) $f(x) = x^4 - 6x^3 + x^2 + 24x - 20 = (x - 1)(x - 2)(x - 5)(x + 2)$

[*1] $x^2 + 2x - 4 = (x + 1 + \sqrt{5})(x + 1 - \sqrt{5})$ と因数分解できますが，これには平方完成の考え方が必要です；$x^2 + 2x - 4 = (x + 1)^2 - 5 = (x + 1)^2 - (\sqrt{5})^2 = (x + 1 + \sqrt{5})(x + 1 - \sqrt{5})$