

Section P.5

$$8. \frac{2x^3 - 6x^2 + 5x - 15}{9 - x^2} = \frac{2x^2(x-3) + 5(x-3)}{-(x^2-9)} = \frac{(x-3)(2x^2+5)}{-(x-3)(x+3)} = -\frac{2x^2+5}{x+3}$$

$$10. \frac{x^3 - x^2 + x}{x^3 + 1} = \frac{x(x^2 - x + 1)}{(x+1)(x^2 - x + 1)} = \frac{x}{x+1}$$

$$14. \left(\frac{4r^2s}{3t^3}\right)^{-1} \left(\frac{6rs^3}{5t^2}\right) = \frac{3t^3}{4r^2s} \cdot \frac{6rs^3}{5t^2} = \frac{9s^2t}{10r}$$

$$22. \frac{6x^2 + 13xy + 6y^2}{4x^2 - 9y^2} \div \frac{3x^2 - xy - 2y^2}{2x^2 + xy - 3y^2} = \frac{(3x+2y)(2x+3y)}{(2x-3y)(2x+3y)} \cdot \frac{(2x+3y)(x-y)}{(3x+2y)(x-y)} = \frac{2x+3y}{2x-3y}$$

$$24. \frac{2s+5t}{4t} + \frac{-2s+3t}{4t} = \frac{2s+5t-2s+3t}{4t} = \frac{8t}{4t} = 2$$

$$34. \frac{2}{y} - \frac{3}{y+1} \cdot \frac{y^2-1}{y+4} = \frac{2}{y} - \frac{3}{y+1} \cdot \frac{(y-1)(y+1)}{y+4} = \frac{2}{y} - \frac{3(y-1)}{y+4} = \frac{2(y+4) - 3(y-1)y}{y(y+4)} = \frac{2(y+4) - y[3(y-1)]}{y(y+4)}$$

$$= \frac{2y+8-3y^2+3y}{y(y+4)} = \frac{-3y^2+5y+8}{y(y+4)} = -\frac{3y^2-5y-8}{y(y+4)} = -\frac{(3y-8)(y+1)}{y(y+4)}$$

$$37. \frac{1}{x^2+7x+12} + \frac{1}{x^2-9} + \frac{1}{x^2-16} = \frac{1}{(x+3)(x+4)} + \frac{1}{(x-3)(x+3)} + \frac{1}{(x-4)(x+4)}$$

$$= \frac{1(x-3)(x-4) + 1(x-4)(x+4) + 1(x-3)(x+3)}{(x+3)(x+4)(x-3)(x-4)}$$

$$= \frac{x^2-7x+12+x^2-16+x^2-9}{(x+3)(x+4)(x-3)(x-4)} = \frac{3x^2-7x-13}{(x+3)(x+4)(x-3)(x-4)}$$

$$39. \left(1 + \frac{2}{x}\right)\left(3 - \frac{1}{x}\right) = \left(\frac{x+2}{x}\right)\left(\frac{3x-1}{x}\right) = \left(\frac{x+2}{x}\right)\left(\frac{3x-1}{x}\right) = \frac{(x+2)(3x-1)}{x^2}$$

$$44. \frac{3 + \frac{2}{x-3}}{4 + \frac{1}{2 + \frac{1}{x}}} = \frac{3 + \frac{2}{x-3}}{4 + \frac{1}{\frac{2x+1}{x} + \frac{1}{x}}} = \frac{3 + \frac{2}{x-3}}{4 + \frac{1}{\frac{2x+1+x}{x}}} = \frac{3 + \frac{2}{x-3}}{4 + 1 \div \frac{2x+1}{x}} = \frac{3 + \frac{2}{x-3}}{4 + 1 \cdot \frac{x}{2x+1}} = \frac{3 + \frac{2}{x-3}}{4 + \frac{x}{2x+1}} = \frac{3(x-3) + \frac{2}{x-3}}{\frac{4(2x+1) + \frac{x}{2x+1}}{2x+1}}$$

$$= \frac{\frac{3(x-3)+2}{x-3}}{\frac{4(2x+1)+x}{2x+1}} = \frac{\frac{3x-9+2}{x-3}}{\frac{8x+4+x}{2x+1}} = \frac{\frac{3x-7}{x-3}}{\frac{9x+4}{2x+1}} = \frac{3x-7}{x-3} \div \frac{9x+4}{2x+1} = \frac{3x-7}{x-3} \cdot \frac{2x+1}{9x+4} = \frac{(3x-7)(2x+1)}{(x-3)(9x+4)}$$

$$58. \frac{2y^2+11y+15}{6y^2+11y-10} = \frac{(2y+5)(y+3)}{(3y-2)(2y+5)} = \frac{2y+5}{3y-2} \cdot \frac{y-7}{2y+5} = \frac{2y+5}{y-7} \div \frac{2y+5}{y-7} = \frac{2y+5}{y-7} \cdot \frac{y-7}{2y+5} = 1$$

$$61. \frac{a^{-1}b - ab^{-1}}{a^2 + b^2} = \frac{\frac{b}{a} - \frac{a}{b}}{a^2 + b^2} = \frac{\frac{(b)b - a(a)}{(b)a \cdot b(a)}}{a^2 + b^2} = \frac{\frac{b^2 - a^2}{ab}}{a^2 + b^2} = \frac{b^2 - a^2}{ab(a^2 + b^2)} = \frac{b^2 - a^2}{ab} \div a^2 + b^2$$

$$= \frac{b^2 - a^2}{ab} \cdot \frac{1}{a^2 + b^2} = \frac{b^2 - a^2}{ab(a^2 + b^2)} = \frac{(b-a)(b+a)}{ab(a^2 + b^2)}$$

$$76. \frac{x+y}{x-y} \cdot \frac{x^{-1} - y^{-1}}{x^{-1} + y^{-1}} = \frac{x+y}{x-y} \cdot \frac{\frac{1}{x} - \frac{1}{y}}{\frac{1}{x} + \frac{1}{y}} \cdot \frac{xy}{xy} = \frac{x+y}{x-y} \cdot \frac{y-x}{y+x} = -1$$