

$$1. \quad \frac{1}{x} + \frac{1}{x^2} + \frac{1}{x^3} = \frac{x^2+x+1}{x^3}$$

$$2. \quad \frac{4}{x} - \frac{2}{x^2} + \frac{1}{2x} = \frac{8x-4+x}{2x^2} = \frac{9x-4}{2x^2}$$

$$3. \quad \frac{1}{ax} - \frac{a}{2x} + \frac{1}{ax^2} = \frac{2x-a^2x+2}{2ax^2}$$

$$4. \quad \frac{1}{a} + \frac{1}{a+b} = \frac{a+b+a}{a(a+b)} = \frac{2a+b}{a(a+b)}$$

$$5. \quad \frac{1}{a+b} + \frac{1}{a-b} = \frac{a-b+a+b}{(a+b)(a-b)} = \frac{2a}{(a+b)(a-b)}$$

$$6. \quad \frac{1}{x+1} + \frac{1}{x+2} = \frac{x+2+x+1}{(x+1)(x+2)} = \frac{2x+3}{(x+1)(x+2)}$$

$$7. \quad \frac{1}{x+y} + \frac{1}{x-y} = \frac{x-y+x+y}{(x+y)(x-y)} = \frac{2x}{(x+y)(x-y)}$$

$$8. \quad \frac{1}{x+y} - \frac{1}{x-y} = \frac{x-y-(x+y)}{(x+y)(x-y)} = \frac{x-y-x-y}{(x+y)(x-y)} = \frac{-2y}{(x+y)(x-y)}$$

$$9. \quad \frac{x+y}{x-y} + \frac{x-y}{x+y} = \frac{(x+y)(x+y)+(x-y)(x-y)}{(x-y)(x+y)} = \frac{x^2+2xy+y^2+x^2-2xy+y^2}{(x-y)(x+y)} =$$

$$\frac{2x^2+2y^2}{(x-y)(x+y)} = \frac{2(x^2+y^2)}{(x-y)(x+y)}$$

$$10. \frac{x+y}{x-y} - \frac{x-y}{x+y} = \frac{(x+y)(x+y) - (x-y)(x-y)}{(x-y)(x+y)} = \frac{x^2+2xy+y^2 - (x^2-2xy+y^2)}{(x-y)(x+y)} =$$

$$\frac{x^2+2xy+y^2 - x^2+2xy-y^2}{(x-y)(x+y)} = \frac{4xy}{\underline{\underline{(x+y)(x-y)}}}$$

$$11. \frac{2a}{a-b} - \frac{a-b}{a+b} = \frac{2a(a+b) - (a-b)(a-b)}{(a-b)(a+b)} = \frac{2a^2+2ab - (a^2-2ab+b^2)}{(a-b)(a+b)} =$$

$$\frac{2a^2+2ab - a^2+2ab-b^2}{(a-b)(a+b)} = \frac{a^2+4ab-b^2}{\underline{\underline{(a-b)(a+b)}}}$$

$$12. \frac{a+b}{a-b} + \frac{a}{b} = \frac{b(a+b) + a(a-b)}{b(a-b)} = \frac{ab+b^2+a^2-ab}{b(a-b)} = \frac{a^2+b^2}{\underline{\underline{b(a-b)}}}$$

$$13. \frac{a}{a-b} + 1 = \frac{a+a-b}{(a-b)} = \frac{2a-b}{\underline{\underline{(a-b)}}}$$

$$14. 1 - \frac{a}{a+b} = \frac{a+b-a}{(a+b)} = \frac{b}{\underline{\underline{(a+b)}}}$$

$$15. \frac{1}{x+1} - \frac{1}{x+2} = \frac{x+2 - (x+1)}{(x+1)(x+2)} = \frac{x+2-x-1}{(x+1)(x+2)} = \frac{1}{\underline{\underline{(x+1)(x+2)}}}$$

$$16. \frac{2}{u-1} + \frac{4}{u+2} = \frac{2(u+2) + 4(u-1)}{(u-1)(u+2)} = \frac{2u+4+4u-4}{(u-1)(u+2)} = \frac{6u}{\underline{\underline{(u-1)(u+2)}}}$$