

Integration via partial Fractions "Answer Key"

$$1. \int \frac{3x+5}{x^2-4x-5} dx = \frac{10}{3} \ln(5-x) - \frac{1}{3} \ln(x+1) + C$$

$$2. \int \frac{2x-1}{x^2-5x+6} dx = 5 \ln(3-x) - 3 \ln(2-x) + C$$

$$3. \int \frac{1}{(x-3)(x^2-4)} dx = \frac{1}{5} \ln(x-3) - \frac{1}{4} \ln(x-2) + \frac{1}{20} \ln(x+2) + C$$

$$4. \int \frac{3}{(x+1)(x^2+x)} dx = \frac{3}{x+1} + 3 \ln(x) - 3 \ln(x+1) + C$$

$$5. \int \frac{x^2+11x}{(x-1)(x+1)^2} dx = \frac{-5}{x+1} + 3 \ln(1-x) - 2 \ln(x+1) + C$$

$$6. \int \frac{4x^2-21}{(x-3)^2(2x+3)} dx = \frac{3}{x-3} + \ln(3-x) + \ln(2x+3) + C$$

$$7. \int \frac{3x+6}{x^2(x-1)(x-3)} dx = -\frac{2}{x} - \frac{9}{2} \ln(1-x) + \frac{5}{6} \ln(3-x) + \frac{11}{3} \ln(x) + A$$

$$8. \int \frac{x^2-x+1}{x^2+x} dx = x + \ln(x) - 3 \ln(x+1) + B$$

$$9. \int \frac{1}{x(x^2+1)} dx = \ln(x) - \frac{1}{2} \ln(x^2+1) + C$$

$$10. \int \frac{3x^2-4x+5}{(x-1)(x^2+1)} dx = \frac{1}{2} \ln(x^2+1) + 2 \ln(x-1) - 3 \arctan(x) + D$$

$$11. \int \frac{x^2}{(x+1)(x^2+1)} dx = \frac{1}{4} \ln(x^2+1) + \frac{1}{2} \ln(x+1) - \frac{1}{2} \arctan(x) + E$$

$$12. \int \frac{6x^2+7x-6}{(x^2-4)(x+2)} dx = \frac{1}{x+2} + 2 \ln(x-2) + 4 \ln(x+2) + F$$

$$13. \int \frac{1}{x(x^2+25)} dx = \frac{1}{25} \ln(x) - \frac{1}{50} \ln(x^2+25) + G$$

$$14. \int \frac{10}{(x+1)(x^2+9)^2} dx = \frac{1}{10} \ln(x+1) - \frac{1}{20} \ln(x^2+9) + \frac{x+9}{18(x^2+9)} + \frac{7}{135} \arctan\left(\frac{x}{3}\right) + H$$

Partial Fractions continued...

$$15. \int \frac{100x}{(x-3)(x^2+1)^2} dx = \frac{5(x+3)}{x^2+1} - \frac{3}{2} \ln(x^2+1) + 3 \ln(3-x) - 4 \arctan(x) + I$$

$$16. \int \frac{1}{x^4-1} dx = \frac{1}{4} \ln(1-x) - \frac{1}{4} \ln(x+1) - \frac{1}{2} \arctan(x) + J$$

$$17. \int \frac{x^2+3}{(x^2+2x+3)^2} dx = \frac{x+3}{2(x^2+2x+3)} + \frac{3\sqrt{2}}{4} \arctan\left(\frac{x+1}{\sqrt{2}}\right) + K$$

$$18. \int \frac{1}{(x+2)(x^2+4x+10)} dx = \frac{1}{6} \ln(x+2) - \frac{1}{12} \ln(x^2+4x+10) + L$$