

How to Integrate certain rational Fractions "Answer Key"

$$1. \int \frac{1}{(4x+1)^3} dx = \frac{-1}{8(4x+1)^2} + C$$

$$2. \int \frac{1}{9x^2+1} dx = \frac{1}{3} \arctan(3x) + C$$

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

$$4. \int \frac{3x-5}{x^2+9} dx = \frac{3}{2} \ln(x^2+9) - \frac{5}{3} \arctan\left(\frac{x}{3}\right) + C$$

$$5. \int \frac{1}{9x^2+4} dx = \frac{1}{6} \arctan\left(\frac{3}{2}x\right) + C$$

$$6. \int \frac{1}{x^2+2x+3} dx = \frac{1}{\sqrt{2}} \arctan\left(\frac{x+1}{\sqrt{2}}\right) + C$$

$$7. \int \frac{1}{x^2+2x+5} dx = \frac{1}{2} \arctan\left(\frac{x+1}{2}\right) + C$$

$$8. \int \frac{1}{x^2-2x+3} dx = \frac{1}{\sqrt{2}} \arctan\left(\frac{x-1}{\sqrt{2}}\right) + C$$

$$9. \int \frac{1}{2x^2+6x+5} dx = \arctan(2x+3) + C$$

$$10. \int \frac{x}{5x^2-3x+2} dx = \frac{1}{10} \ln(5x^2-3x+2) + \frac{3}{5\sqrt{31}} \arctan\left(\frac{10x-3}{\sqrt{31}}\right) + C$$

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

$$12. \int \frac{3x+5}{3x^2+2x+1} dx = \frac{1}{2} \ln(3x^2+2x+1) + 2\sqrt{2} \arctan\left(\frac{3x+1}{\sqrt{2}}\right) + C$$