

Integration by substitution

No product rule and quotient rule for integration

Multiply

1. $\int (x^2 + 3x)^3 (2x + 3) dx$ Let $u = x^2 + 3x$ $\frac{du}{dx} = 2x + 3$ $dx = \frac{du}{2x+3}$ $\int u^3 (2x + 3) dx$

$$= \int u^{3} (2x+3) \frac{du}{2x+3}$$

= $\int u^{3} du$
= $\frac{1}{4}u^{4} + C$
= $\frac{1}{4}(x^{2}+3x)^{4} + C$



$$2.\int 3x^2(x^3-2)\,dx$$

Fraction



$$1. \int \frac{3x^2+2}{x^3+2x} dx$$

Let
$$u = x^3 + 2x$$

 $\frac{du}{dx} = 3x^2 + 2$
 $dx = \frac{du}{3x^2 + 2}$

$$\int \frac{3x^2 + 2}{u} dx$$
$$= \int \frac{3x^2 + 2}{u} x \frac{du}{3x^2 + 2}$$
$$= \int \frac{1}{u} du$$
$$= \ln u + C$$
$$= \ln x^3 + 2x + C$$



$$2.\int \frac{4x^3-1}{x^4-x} dx$$



Paper 1



1. Use
$$f'(x) = sin^3(2x)\cos(2x)$$
.

Find
$$f(x)$$
, given that $f\left(\frac{\pi}{4}\right) = 1$.



- 2. Et $g(x) = \frac{\ln x}{x}$.
- (a) Find g'(x).
- (b) Find $\int g(x) dx$.

Book a free trial lesson! WhatsApp: 9247 7667 COPYRIGHT © 2019 CM Square Learning Center. All rights reserved.