

## 11.4) Reverse chain rule

## Worked example

## Your turn

Find:

$$\int x^3(x^4 - 2)^5 dx$$

$$\int x^2(x^3 - 5)^4 dx$$

Find:

$$\int x(x^2 + 5)^3 dx$$

$$\frac{1}{8}(x^2 + 5)^4 + c$$

## Worked example

Find:

$$\int \sin x \cos^4 x \, dx$$

$$\int \sin^3 x \cos x \, dx$$

## Your turn

Find:

$$\int \cos x \sin^2 x \, dx$$

$$\frac{1}{3} \sin^3 x + c$$

## Worked example

Find:

$$\int \frac{x^3}{x^4 + 1} dx$$

$$\int \frac{x^2}{4x^3 - 5} dx$$

## Your turn

Find:

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

$$\frac{1}{6} \ln|3x^2 + 2| + c$$

## Worked example

Find:

$$\int \frac{4x^3}{x^4 + 1} dx$$

$$\int \frac{12x^2}{4x^3 - 5} dx$$

## Your turn

Find:

$$\int \frac{6x}{3x^2 + 2} dx$$

$$\ln|3x^2 + 2| + c$$

## Worked example

Find:

$$\int \frac{x}{(x^2 - 3)^5} dx$$

$$\int \frac{x^2}{(x^3 - 2)^4} dx$$

## Your turn

Find:

$$\int \frac{x}{(x^2 + 5)^3} dx$$
$$-\frac{1}{4}(x^2 + 5)^{-2} + c$$

## Worked example

Find:

$$\int x^3 e^{x^4+5} dx$$

$$\int x^2 e^{x^3-4} dx$$

## Your turn

Find:

$$\int x e^{x^2+1} dx$$

$$\frac{1}{2} e^{x^2+1} + c$$

## Worked example

Find:

$$\int \frac{3x^2 + 5}{\sqrt{x^3 + 5x - 2}} dx$$

$$\int \frac{12x^3 - 45x^2}{\sqrt{x^4 - 5x^3 + 1}} dx$$

## Your turn

Find:

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

$$2\sqrt{x^2 + x - 3} + c$$



## Worked example

Find:

$$\int \frac{\sin x}{\cos x + 5} dx$$

$$\int \frac{\sec^2 x}{\tan x - 3} dx$$

## Your turn

Find:

$$\int \frac{\cos x}{\sin x + 2} dx$$

$$\ln|\sin x + 2| + c$$

## Worked example

Find:

$$\int \sin x e^{\cos x} dx$$

$$\int \sec^2 x e^{\tan x} dx$$

## Your turn

Find:

$$\int \cos x e^{\sin x} dx$$

$$e^{\sin x} + c$$

## Worked example

Find:

$$\int \sin x (\cos x - 1)^5 dx$$

$$\int \sec^2 x (\tan x + 3)^6 dx$$

## Your turn

Find:

$$\int \cos x (\sin x - 5)^7 dx$$

$$\frac{1}{8} (\sin x - 5)^8 + c$$

## Worked example

Find:

$$\int \sec^2 x \tan x \, dx$$

$$\int 2 \sec^3 x \tan x \, dx$$

## Your turn

Find:

$$\int 3 \sec^4 x \tan x \, dx$$

$$\frac{3}{4} \sec^4 x + c$$

## Worked example

Find:

$$\int \frac{\operatorname{cosec}^2 x}{(3 - \cot x)^4} dx$$

$$\int \frac{\sec^2 x}{(3 + \tan x)^2} dx$$

## Your turn

Find:

$$\int \frac{\operatorname{cosec}^2 x}{(2 + \cot x)^3} dx$$
$$\frac{1}{2} (2 + \cot x)^{-2} + c$$

## Worked example

Find:

$$\int \frac{\sin 4x}{\cos 4x + 2} dx$$

$$\int \frac{\sec^2 3x}{\tan 3x - 5} dx$$

## Your turn

Find:

$$\int \frac{\cos 2x}{\sin 2x + 3} dx$$

$$\frac{1}{2} \ln |\sin 2x + 3| + c$$

## Worked example

Find:

$$\int \tan x \, dx$$

## Your turn

Find:

$$\int \cot x \, dx$$

$$\ln |\sin x| + c$$