

more examples: $\int_0^2 x^2 \sqrt{x^3+1} dx$, $\int_0^{\pi/4} \tan^3 x \sec^2 x dx$, $\int_0^1 \frac{x}{x^2+1} dx$

§5.7 More integrals

recall: $\frac{d}{dx} (\ln(x)) = \frac{1}{x}$ so $\int \frac{1}{x} dx = \ln|x| + C$

$\frac{d}{dx} (\sin^{-1}(x)) = \frac{1}{\sqrt{1-x^2}}$ $\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1}(x) + C$

$\frac{d}{dx} (\tan^{-1}(x)) = \frac{1}{1+x^2}$ $\int \frac{1}{1+x^2} dx = \tan^{-1}(x) + C$

$\frac{d}{dx} (\sec^{-1}(x)) = \frac{1}{|x| \sqrt{x^2-1}}$ $\int \frac{1}{|x| \sqrt{x^2-1}} dx = \sec^{-1}(x) + C$

$\frac{d}{dx} (e^x) = e^x$ $\int e^x dx = e^x + C$

Recall: $b^x = e^{x \ln(b)}$
 $\int b^x dx = \int e^{x \ln(b)} dx = \frac{1}{\ln(b)} e^{x \ln(b)} + C$
(sub $u = x \ln(b)$)

Example $\int \frac{1}{9+x^2} dx = \frac{1}{9} \int \frac{1}{1+x^2/9} dx = \frac{1}{9} \int \frac{1}{1+(x/3)^2} dx$

substitute $u = \frac{x}{3}$

$\int \frac{1}{\sqrt{1-4x^2}} dx = \int \frac{1}{\sqrt{1-(2x)^2}} dx$ sub $u = 2x$...

Examples

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$$\int x(x+1)^9 dx$$

$$\int \sqrt{4x-1} dx$$

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

$$\int x \cos(x^2) dx$$

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

$$\int \frac{1}{x \ln(x)} dx$$

$$\int \frac{e^{2x} + e^{4x}}{e^x} dx$$

$$\int 2^x dx$$

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