

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

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

sub $u = x/3 \dots$

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

Examples $\int x(x+1)^9 dx$ $\int \sqrt{4x-1} dx$ $\int \sin^2 x \cos x dx$

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

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

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

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

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