

$$\frac{d}{dx}(\sin^{-1}(x)) = \frac{1}{\sqrt{1-x^2}} \quad \text{so} \quad \int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1}(x) + c$$

$$\frac{d}{dx}(\tan^{-1}(x)) = \frac{1}{1+x^2} \quad \text{so} \quad \int \frac{1}{1+x^2} dx = \tan^{-1}(x) + c$$

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

$$\frac{d}{dx}(e^x) = e^x \quad \text{so} \quad \int e^x dx = e^x + c$$

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  $u = x \ln(b)$ )

Examples

①  $\int \frac{1}{9+4x^2} dx = \frac{1}{9} \int \frac{1}{1+\frac{4x^2}{9}} dx = \frac{1}{9} \int \frac{1}{1+(\frac{x}{3})^2} dx$  sub  $u = \frac{x}{3}$ .

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

③  $\int x(x+1)^9 dx$

⑨  $\int \frac{e^{2x} + e^{4x}}{e^x} dx$

④  $\int \sqrt{4x-1} dx$

⑩  $\int 2^x dx$

⑤  $\int \sin^2 x \cos x dx$

⑪  $\int x e^{x^2} dx$

⑥  $\int x \cos(x^2) dx$

⑦  $\int x \sqrt{x^2-1} dx$

⑧  $\int \frac{1}{x \ln(x)} dx$