Table of indefinite integrals

1.) $\int (f(x) + g(x))\,dx = \int f(x)\,dx + \int g(x)\,dx$

because $\int f(x)\,dx + \int g(x)\,dx = F(x) + C_1 + G(x) + C_2 =$

$[F(x) + G(x)] + C$, C is a constant as well as C_1 & C_2

and $\frac{d}{dx}(F(x) + G(x) + C) = f(x) + g(x)$

2.) $\int k \cdot f(x)\,dx = k \cdot \int f(x)\,dx$

~~Prove it~~:

3.) $\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$, C is constant

n is real number with $n \neq -1$

4.) $\int \frac{1}{x}\,dx = \int \frac{dx}{x} = \ln|x| + C$

To show it, prove $\frac{d}{dx} \ln|x| = \frac{1}{x}$

(Hint: $|x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases} \Rightarrow \ln|x| = \begin{cases} \ln x, & x \geq 0 \\ \ln(-x), & x < 0 \end{cases}$)

5.) $\int \sin x\,dx = -\cos x + C$

because $\frac{d}{dx}(-\cos x + C = \frac{d}{dx}(\cos x) = -\sin x$

6.) $\int \cos x\,dx = \sin x + C$

7.) $\int \sec^2 x\,dx = \tan x + C$

8.) because $\frac{d}{dx}(\tan x) = \sec^2 x$

8.) $\int \csc^2 x\,dx = -\cot x + C$

9.) $\int \sec x \tan x\,dx = \cancel{\ln}|\sec x| + C$

because $\frac{d}{dx}(\ln|\sec x|) = \frac{1}{\sec x} \cdot \frac{d}{dx}(\sec x) \ominus \longrightarrow$

$\rightarrow \ominus \frac{1}{\sec x} \cdot$ where $\frac{d}{dx}(\sec x) = -\cos^{-2} x\,(-\sin x) = \sin x / \cos^2 x =$

$= \sec^2 x \cdot \sin x = \frac{\sec x \cdot}{\sin x} = \tan x$ $1/\cos x = \cos^{-1} x = (\cos x)^{-1}$ $\frac{1}{\cos^2 x} \cdot \sin x = \sec^2 x \cdot \sin x$