Some standard integrals

$$\int x^n dx =$$

$$\int (f(x))^n f'(x) dx =$$

Example: $\int \sin^5 x \cos x \, dx =$

$n = -1$ case:

Examples: $\int \tan x \, dx =$

$\int \cot x \, dx =$

$$\int f'(x) e^{f(x)} dx =$$

Examples: $\int e^{kx} dx =$ $\int x^2 e^{x^3} dx =$

$$\int f'(x) \cos(f(x)) dx =$$

Example: $\int \cos(kx) dx =$

$$\int f'(x) \sin(f(x)) dx =$$

Example: $\int \sin(kx) dx =$

Other trigonometric integrals:

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

$$\int \csc^2 x \, dx \; =$$
$$\int \csc x \cot x \, dx \; =$$
$$\int \csc x \, dx \; =$$

Using the identity $\sin^2 \theta = \dfrac{1 - \cos 2\theta}{2}$ (which can be derived from $\cos 2\theta = \cos^2 \theta - \sin^2 \theta$),

$$\int \sin^2 (kx) \, dx \; =$$

Using the identity $\cos^2 \theta = \dfrac{1 + \cos 2\theta}{2}$,

$$\int \cos^2 (kx) \, dx \; =$$

Using the substitution $x = a \tan \theta \;\; \Rightarrow \;\; dx = a \sec^2 \theta \, d\theta$ and
$a^2 + x^2 = a^2 \left(1 + \tan^2 \theta\right) = a^2 \sec^2 \theta$,

$$\int \frac{1}{a^2 + x^2} \, dx \; =$$

Using the substitution $x = a \sin \theta \;\; \Rightarrow \;\; dx = a \cos \theta \, d\theta$ and
$\sqrt{a^2 - x^2} = \sqrt{a^2 \left(1 - \sin^2 \theta\right)} = a \cos \theta$,

$$\int \frac{1}{\sqrt{a^2 - x^2}} \, dx \; =$$

Integration by parts (tabular version) – the table terminates in one of three ways:

1.   Left column ends in zero (one factor in the integrand must be a polynomial).

Example:

$$\int \left(x^2 - 1\right)\cos 2x \, dx \;=$$

2.   The last row is easily integrated:

Example: $\left(n \neq -1\right)$

$$\int x^n \ln x \, dx \;=$$

Case $n = 0$: $\int \ln x \, dx \;=$

3.   The last row is a constant multiple of the original integrand:

Example:

$$I = \int e^{ax} \sin bx \, dx =$$

Example:

$$I = \int \frac{\ln x}{x} \, dx =$$