Higher Integrals

In the following, a, b and n are real constants with no restrictions unless otherwise stated.

Focus on the special cases.

* indicates the only integrals given in the exam.

Powers of a Linear Function

$$\int (ax+b)^n \, dx = \frac{(ax+b)^{n+1}}{a\,(n+1)} + C$$

$$(n \in \mathbb{R} \setminus \{1\})$$

Special cases

- $b = 0$ gives $\displaystyle\int Ax^n \, dx = \frac{Ax^{n+1}}{(n+1)} + C \quad (A \overset{def}{=} a^n)$
- $b = 0, a = 1$ gives $\displaystyle\int x^n \, dx = \frac{x^{n+1}}{(n+1)} + C$
- $b = 0, n = 1$ gives $\displaystyle\int ax \, dx = \frac{ax^2}{2} + C$
- $a = 0, n = 1$ gives $\displaystyle\int b \, dx = bx + C$
- $b = 0, a = 1, n = \frac{1}{2}$ gives $\displaystyle\int x^{1/2} \, dx = \frac{2}{3}x^{3/2} + C$

Sine and Cosine

$$\int \sin(ax+b)\,dx = -\frac{1}{a}\cos(ax+b) + C$$

$$(a \in \mathbb{R}\setminus\{0\})$$

$$\int \cos(ax+b)\,dx = \frac{1}{a}\sin(ax+b) + C$$

$$(a \in \mathbb{R}\setminus\{0\})$$

Special cases

- $b = 0$ gives

$$\int \sin ax\,dx = -\frac{1}{a}\cos ax + C \quad *$$

$$\int \cos ax\,dx = \frac{1}{a}\sin ax + C \quad *$$

- $a = 1, b = 0$ gives

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

$$\int \cos x\,dx = \sin x + C$$