

1. A short table of integrals. In the following, $a \neq 0$.

$$(a) \int \frac{du}{\sqrt{a^2 - u^2}} = \sin^{-1}(u/a) + C \text{ for } u^2 < a^2$$

$$(b) \int \frac{du}{a^2 + u^2} = (1/a) \tan^{-1}(u/a) + C$$

$$(c) \int \frac{du}{u\sqrt{u^2 - a^2}} = (1/a) \sec^{-1} |u/a| + C \text{ for } u^2 > a^2 + C$$

$$(d) \int \frac{du}{\sqrt{a^2 + u^2}} = \sinh^{-1}(u/a) + C \text{ for } a > 0$$

$$(e) \int \frac{du}{\sqrt{u^2 - a^2}} = \cosh^{-1}(u/a) + C \text{ for } u > a > 0$$

$$(f) \int \frac{du}{a^2 - u^2} = \begin{cases} (1/a) \tanh^{-1}(u/a) + C & \text{if } u^2 < a^2 \\ (1/a) \coth^{-1}(u/a) + C & \text{if } u^2 > a^2 \end{cases}$$

$$(g) \int \frac{du}{u\sqrt{a^2 - u^2}} = -(1/a) \operatorname{sech}^{-1}(u/a) + C \text{ for } 0 < u < a$$

$$(h) \int \frac{du}{u\sqrt{a^2 + u^2}} = -(1/a) \operatorname{csch}^{-1} |u/a| + C \text{ for } u \neq 0$$

2. Some identities.

$$(a) \sin^2 x + \cos^2 x = 1$$

$$(b) \sin^2 x = (1 - \cos(2x))/2$$

$$(c) \cos^2 x = (1 + \cos(2x))/2$$

$$(d) \cosh^2 x - \sinh^2 x = 1$$

3. In formulas (3)–(6), x remains fixed as $n \rightarrow \infty$.

$$(a) \lim_{n \rightarrow \infty} \frac{\ln n}{n} = 0$$

$$(b) \lim_{n \rightarrow \infty} \sqrt[n]{n} = 1$$

$$(c) \lim_{n \rightarrow \infty} x^{1/n} = 1 \quad (x > 0)$$

$$(d) \lim_{n \rightarrow \infty} x^n = 0 \quad (|x| < 1)$$

$$(e) \lim_{n \rightarrow \infty} \left(1 + \frac{x}{n}\right)^n = e^x \quad (\text{Any } x)$$

$$(f) \lim_{n \rightarrow \infty} \frac{x^n}{n!} = 0 \quad (\text{Any } x)$$