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

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

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

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

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

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

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

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

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

2. Some useful limits.

   (a) es $\displaystyle\lim_{n\to\infty} \frac{\ln n}{n} = 0.$

   (b) $\displaystyle\lim_{n\to\infty} \sqrt[n]{n} = 1.$

   (c) $\displaystyle\lim_{n\to\infty} x^{1/n} = 1$ for $x > 0.$

   (d) $\displaystyle\lim_{n\to\infty} x^n = 0$ for $|x| < 1.$

   (e) $\displaystyle\lim_{n\to\infty} \left(1 + \frac{x}{n}\right)^n = e^x$ for any $x.$

   (f) $\displaystyle\lim_{n\to\infty} \frac{x^n}{n!} = 0$ for any $x.$

   Note: In limits (c) through (f), x remains fixed as $n \to \infty$.