- Rule of exponents

  For any integers m and n,

  $x^{m/n} = \sqrt[n]{x^m} = (\sqrt[n]{x})^m$

  For any real p, $x^{-p} = \frac{1}{x^p}$

  For any real p and q, $(x^p)^q = x^{pq}$

  For any real p and q, $x^p \cdot x^q = x^{p+q}$

- properties of logarithm function

  For any positive base $b \neq 1$ and positive numbers x and y, we have

  $\log_b(xy) = \log_b x + \log_b y$

  $\log_b(x/y) = \log_b x - \log_b y$

  $\log_b(x^y) = y \log_b x$

  $\log_b(x) = \frac{\ln x}{\ln b}$

- Derivative formulas

  $\frac{d}{dx} e^x = e^x$

  $\frac{d}{dx} \ln x = \frac{1}{x}$

- Formulas for indefinite integrals:

$$\int \frac{1}{\sqrt{x^2 + a^2}}\, dx = \ln(x + \sqrt{x^2 + a^2}) \quad \text{or} \quad \sinh^{-1} \frac{x}{a}$$

$$\int \frac{1}{ax^2 + bx + c}\, dx = \begin{cases} \frac{2}{\sqrt{4ac-b^2}} \tan^{-1} \frac{2ax+b}{\sqrt{4ac-b^2}} & \text{if} \quad b^2 - 4ac < 0 \\ \frac{1}{\sqrt{b^2-4ac}} \ln\left(\frac{2ax+b-\sqrt{b^2-4ac}}{2ax+b+\sqrt{b^2-4ac}}\right) & \text{if} \quad b^2 - 4ac > 0 \end{cases}$$

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

$$\int \frac{1}{x^2 - a^2}\, dx = \frac{1}{2a} \ln \frac{x - a}{x + a} \quad \text{or} \quad -\frac{1}{a} \coth^{-1} \frac{x}{a}$$