Common MIStakes:

- "Distributive law of reciprocal" doesn't exist.
  - $\frac{1}{a+b} \neq \frac{1}{a} + \frac{1}{b}$
  - $\frac{1}{a-b} \neq \frac{1}{a} - \frac{1}{b}$
  - $(a+b)^{-2} \neq a^{-2} + b^{-2}$

- Product of exponential = exponential of sum.
  - $e^a e^b = e^{a+b}$
  - $x^a x^b = x^{a+b}$
  - $(1+t^2)^{-\frac{1}{2}} (1+t^2)^{-\frac{1}{2}} = (1+t^2)^{-1} = \frac{1}{1+t^2}$
    $\neq (1+t^2)^{\frac{1}{4}}$

- $\int \frac{1}{y^3} dy = \int y^{-3} dy = \frac{1}{-2} y^{-2} + c = -\frac{1}{2y^2} + c$
  $\neq \ln y^3 + c$
  $\neq \frac{1}{-4} y^{-4} + c$
  $\neq -3y^{-4} + c$

- Definite integral: u-substitute change of upper/lower limits.

$$\int_0^t \frac{s}{1+s^2} ds = \frac{1}{2} \int_{\boxed{1+0^2}}^{\boxed{1+t^2}} \frac{1}{u} du$$

$\boxed{u = 1+s^2,\ du = 2s\,ds}$

$$\neq \frac{1}{2} \int_0^t \frac{1}{u} du$$