

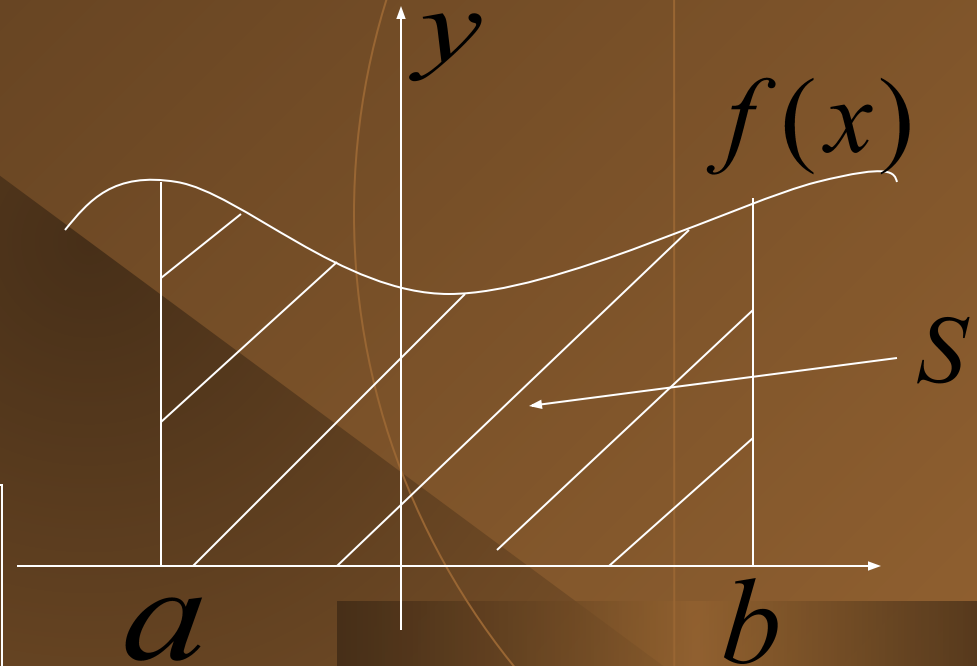
AREA AND VOLUME BY DEFINITE INTEGRAL

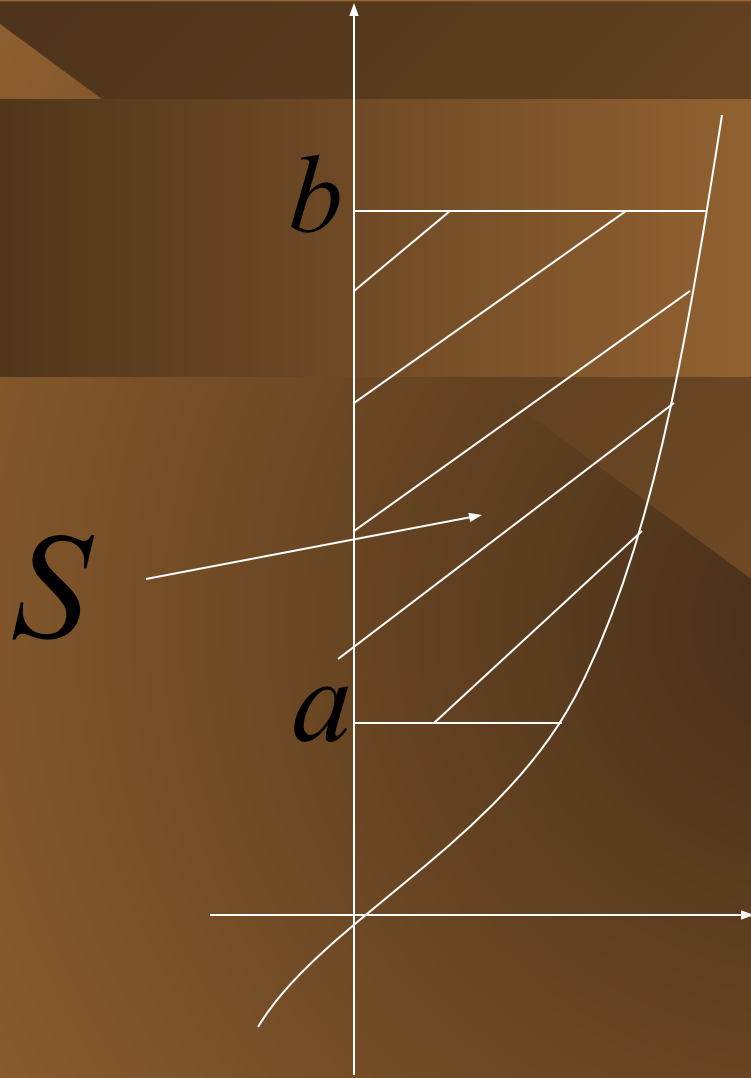
The background features a dark brown gradient with several geometric elements: a thin light brown line forming a large arc on the right side, a vertical line on the left, and a series of vertical bars of varying heights on the right side, resembling a bar chart or a set of data points.

AREA

- ◆ We have a function $y = f(x)$, and two points on the X axis a and b . Then the area formula is

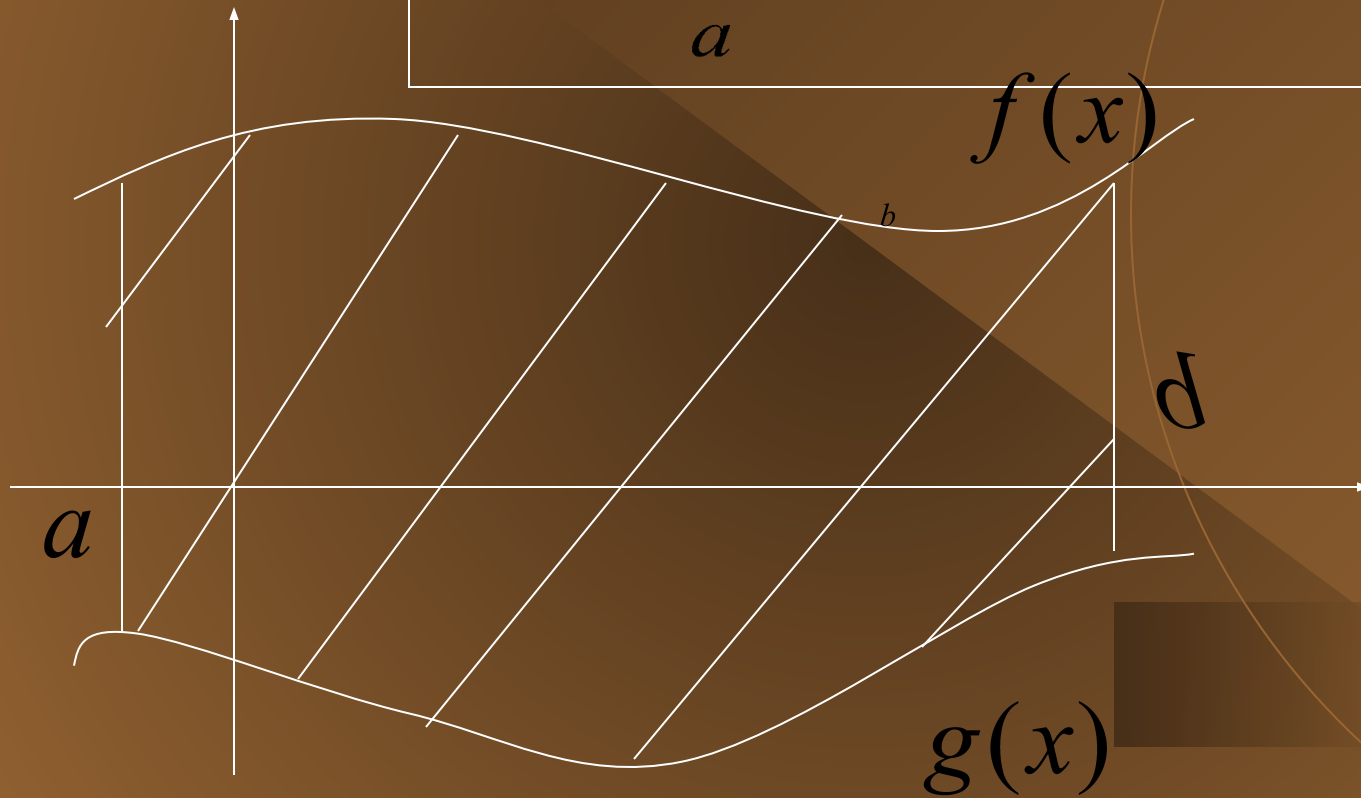
$$S = \int_a^b f(x) dx$$



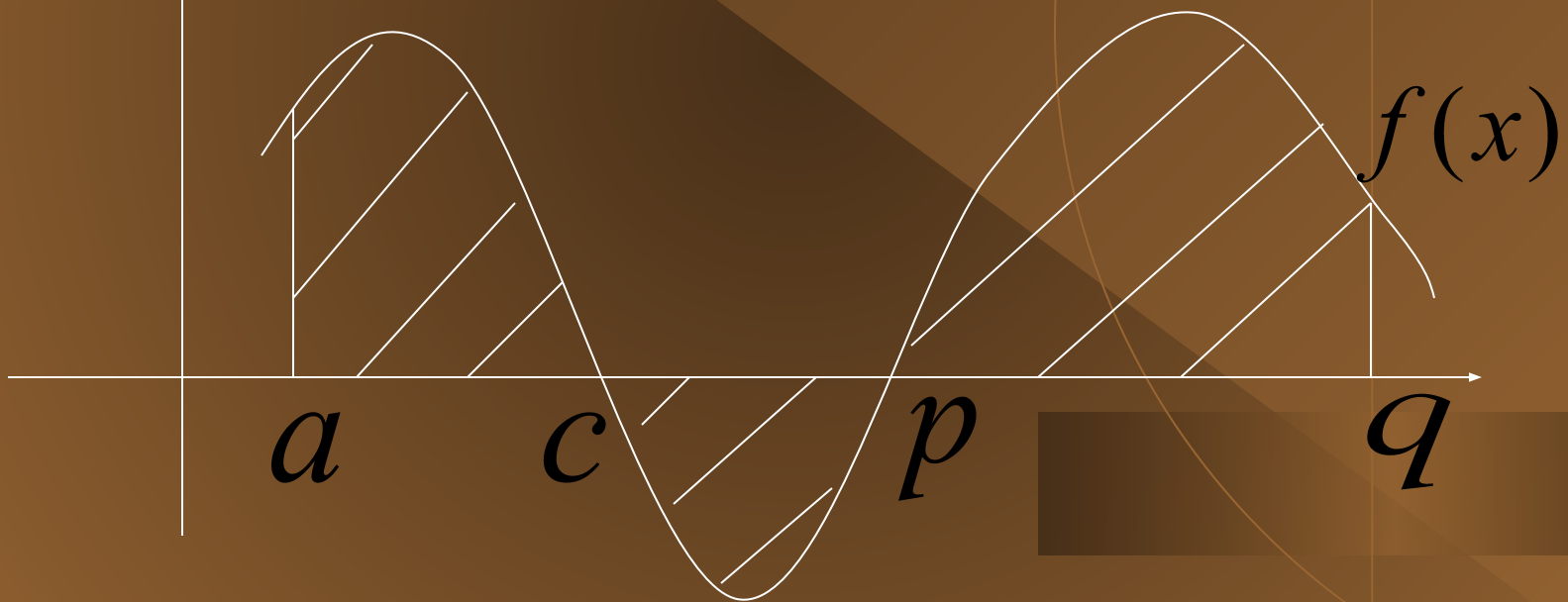


$$S = \int_a^b x dy$$

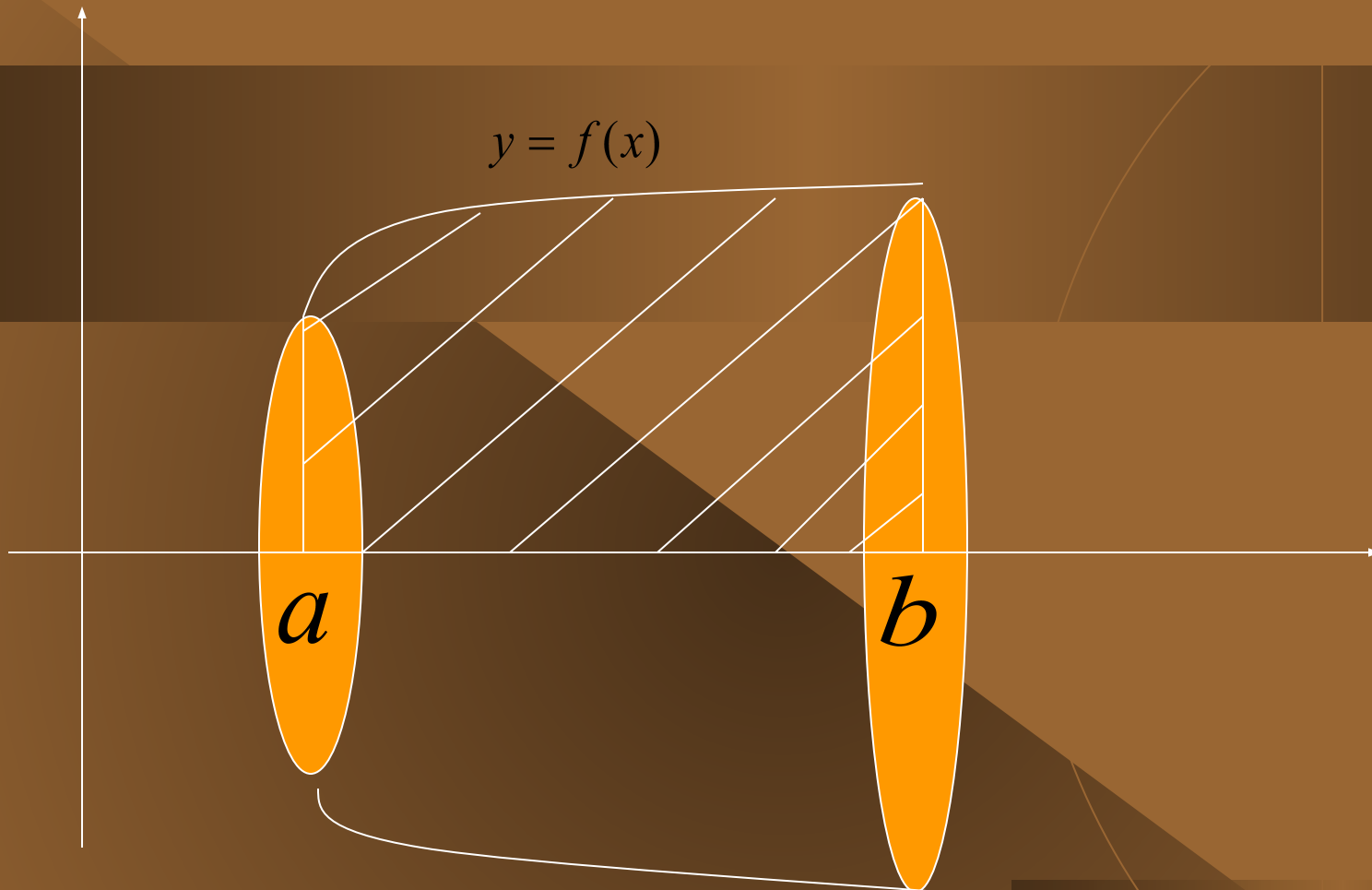
$$S = \int_a^b [f(x) - d(x)] dx$$



$$S = \int_a^c f(x)dx - \int_c^d f(x)dx + \int_d^b f(x)dx$$

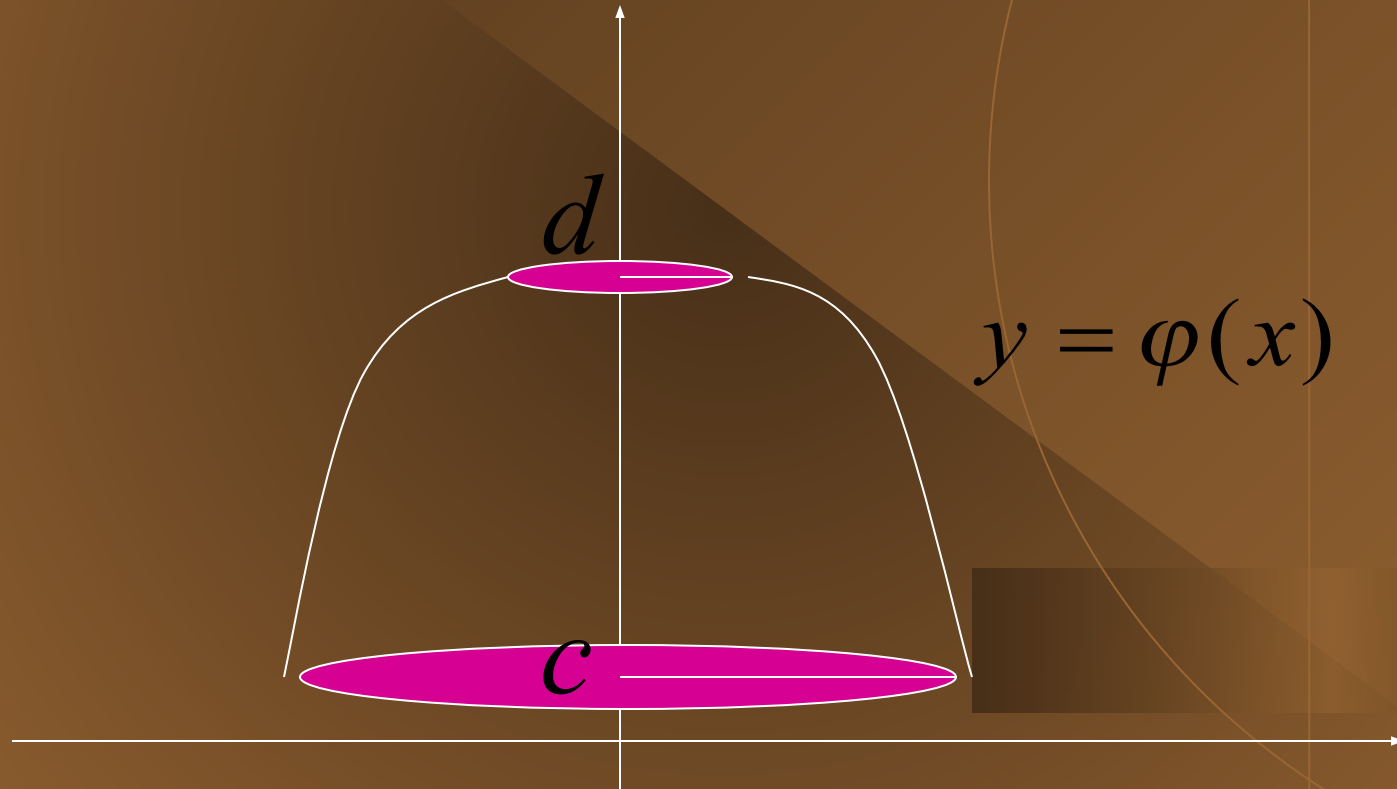


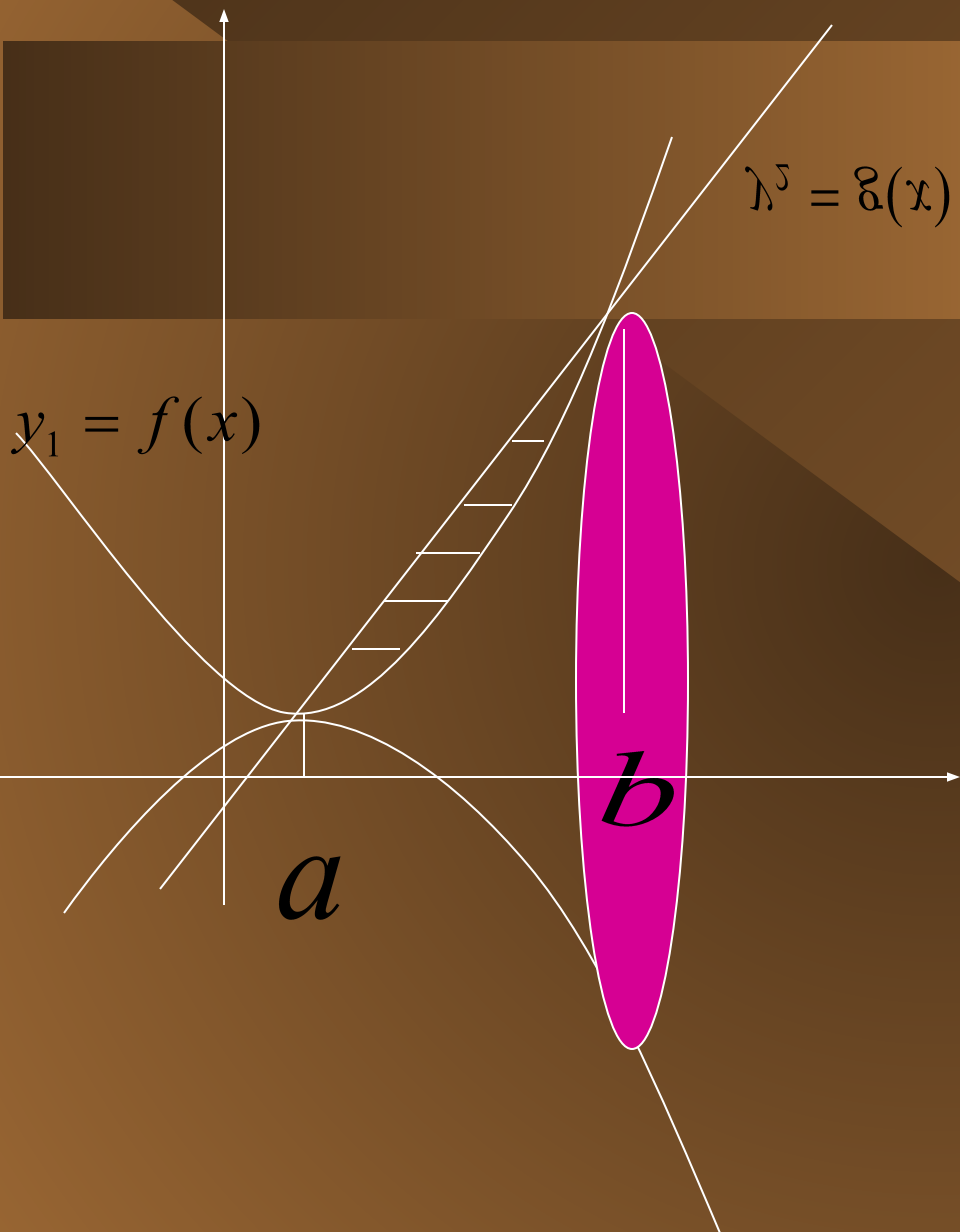
VOLUME



$$V_x = \pi \int_a^b y^2 dx = \pi \int_a^b f^2(x) dx$$

$$V_y = \pi \int_c^d x^2 dy = \pi \int_c^d \varphi^2(y) dy$$





$$y_2 = g(x)$$

$$V_x = \pi \int_a^b (y_1^2 - y_2^2) dx$$

$$V_y = \pi \int_a^b (x_1^2 - x_2^2) dx$$