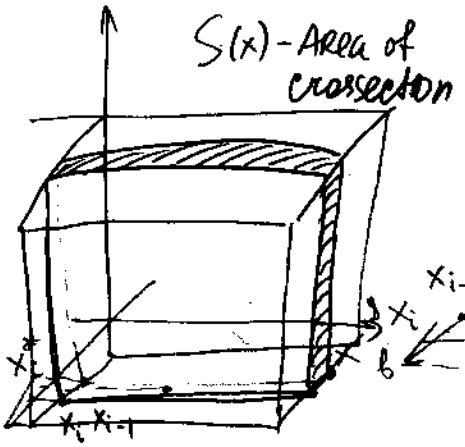
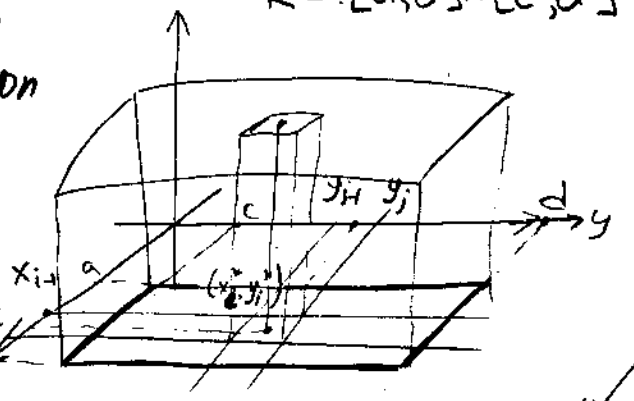
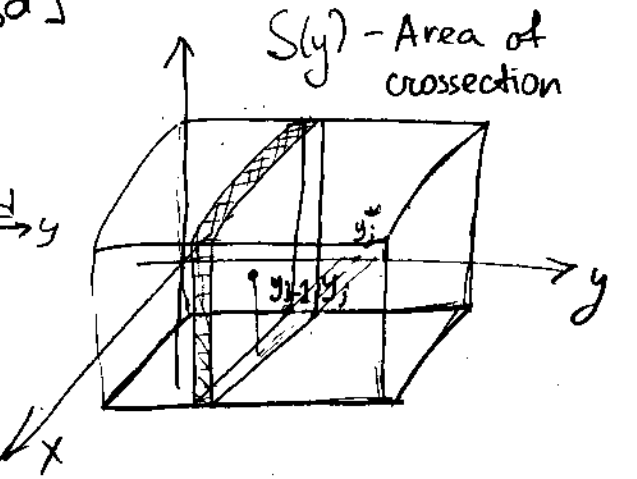
Iterated Integrals

$R = [a,b] \times [c,d]$







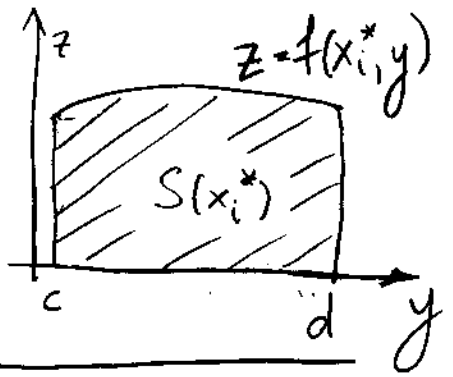
$$\lim_{\Delta x_i \to 0} \sum_i S(x_i^*)\Delta x_i = \int_a^b S(x)\,dx$$

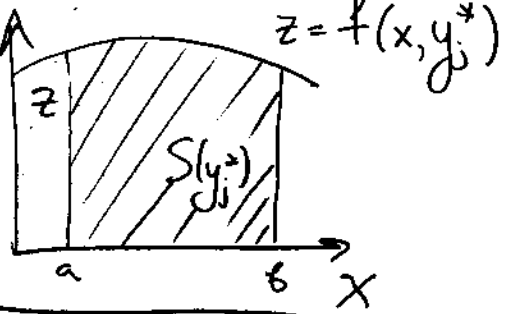
$$\lim_{\substack{\Delta x_i \to 0 \\ \Delta y_j \to 0}} \sum_{ij} f(x_i^*, y_j^*)\Delta A_{ij} = \iint_R f(x,y)\,dA$$

$$\lim_{\Delta y_j \to 0} \sum_j S(y_j^*)\Delta y_j = \int_c^d S(y)\,dy$$

$$\int_a^b \left[\int_c^d f(x,y)\,dy\right]dx$$

$$\int_c^d \left[\int_a^b f(x,y)\,dx\right]dy$$





Provided the middle one exists

$$\int_a^b \int_c^d f(x,y)\,dy\,dx = \iint_R f(x,y)\,dA = \int_c^d \int_a^b f(x,y)\,dx\,dy$$

$R = [a,b] \times [c,d]$