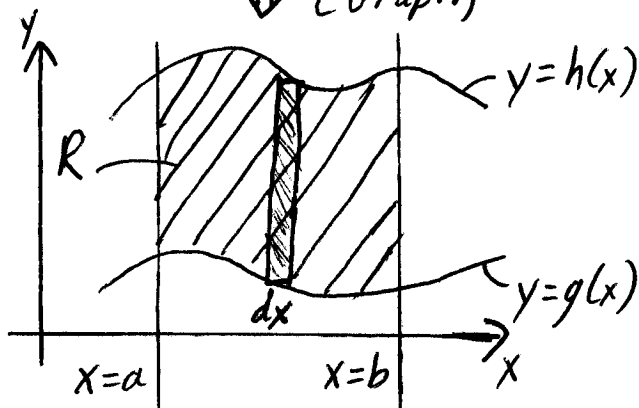


Constructing Bounds of Integration for $\iint_R f(x,y) dA$

a) vertical cross-sections ($dA = dy dx$)

- Region R is bounded by graphs
 $x=a, x=b, y=g(x), y=h(x)$
↓ (Graph)



Described region R :

$$dx: a \leq x \leq b$$

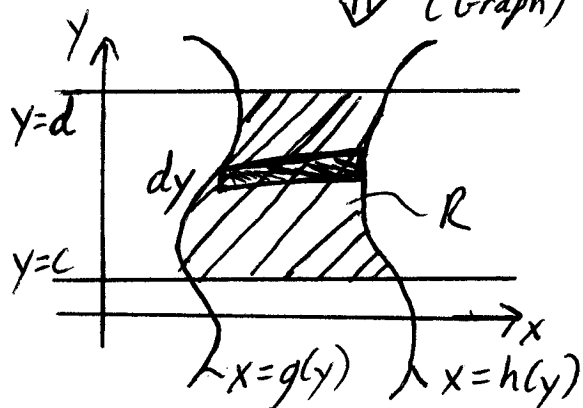
$$g(x) \leq y \leq h(x)$$

Integral of $f(x,y)$ over R :

$$\iint_R f(x,y) dA = \int_a^b \int_{g(x)}^{h(x)} f(x,y) dy dx$$

b) horizontal cross-sections ($dA = dx dy$)

- Region R is bounded by graphs
 $y=c, y=d, x=g(y), x=h(y)$
↓ (Graph)



Described region R :

$$dy: c \leq y \leq d$$

$$g(y) \leq x \leq h(y)$$

Integral of $f(x,y)$ over R :

$$\iint_R f(x,y) dA = \int_c^d \int_{g(y)}^{h(y)} f(x,y) dx dy$$

Notes: 1) Outside bounds of integration MUST be numbers.
2) Inside bounds of integration MUST be functions of outside variables (Numbers are OK).