06-12-23

Day 61

Q1. $\int_0^2 \int_1^3 \int_1^2 xy^2 z \, dz \, dy \, dx$.

$$I = \int_0^2 \int_1^3 \left[xy^2 \left(\frac{z^2}{2}\right)^2 dy \, dx \right] = \frac{3}{2} \int_0^2 \left[\int_1^3 xy^2 \, dy \right] dx$$

$$= \left(\frac{3}{2}\right)\left(\frac{26}{3}\right) \int_0^2 x \, dx = 13 \int_0^2 x \, dx$$

$$= 13 \left(\frac{x^2}{2}\right)^2 = 26$$

1 # Change the order of integration

* dy ▨ strip is vertical
* dx ▤ strip is vertical/Horizontal
* $\int\int dy \, dx$ (with respect to 'x', else Rewrite the Integration)

Q1. Change the order of integration $\int_0^a \int_x^a f(x,y) \, dy \, dx$

Soln:

Given:

$dy \, dx$

y varies from x to a

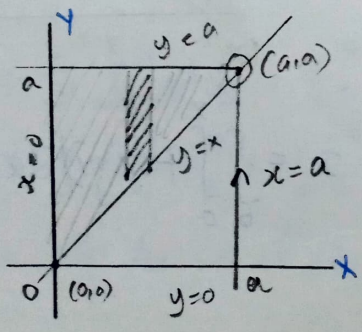
x varies from 0 to a

$y = x$ $\quad y = a$

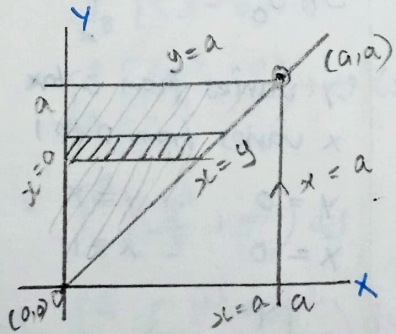
$x = 0$ $\quad x = a$

x	0	0
y=x	0	0

(0,0), (a,a)



Change:



$$\int_0^a \int_0^y f(x,y) \, dx \, dy$$

Q2: $\int_0^1 \int_x^1 f(x,y)\,dy\,dx$

change:

soln: Given:

$\int_0^1 \int_x^1 f(x,y)\,dy\,dx$

y varies from x to 1

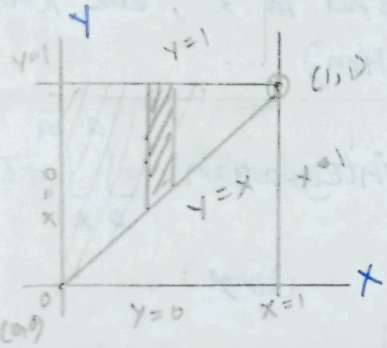
x varies from 0 to 1

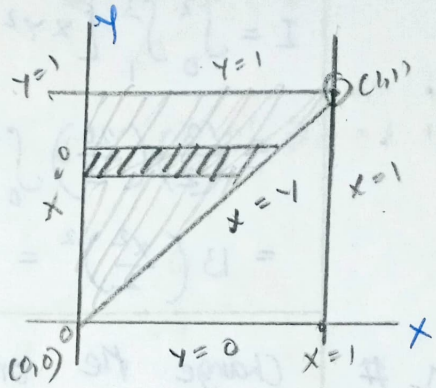
$y = x \qquad y = 1$

$x = 0 \qquad x = 1$

x	0	1
y=x	0	1

(0,0) (1,1)





$$I = \int_0^1 \int_0^y f(x,y)\,dx\,dy$$

Q3. $\int_0^1 \int_0^x f(x,y)\,dy\,dx$

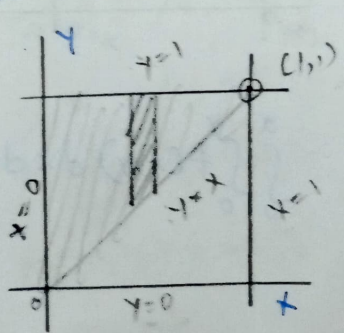
soln:

y varies from 0 to x

x varies from 0 to 1

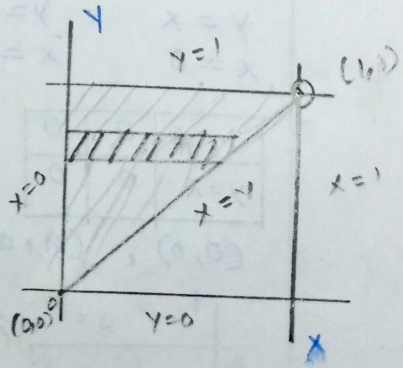
$y = 0 \qquad y = x$

$x = 0 \qquad x = 1$



x	0	1
y	0	1

(0,0) (1,1)



$$I = \int_0^1 \int_0^y f(x,y)\,dx\,dy$$