Change of order of integration

The integral $\iint f(x, y)dydx$ is first integrated w.r.t. the variable 'y', then limit of y are substituted but if we want first integrate w.r.t. 'x' instead of y i.e. we want to change $\iint f(x, y)dydx$ to $\iint f(x, y)dxdy$, then we have to find new limit of x as function of y. This method is called change of order.

We can do easily by graph

Q.1. The value of $\int_0^1 \int_x^1 \sin(y^2)\,dy\,dx$. **JAM – 2017**

(a) $\frac{1+\cos 1}{2}$

(b) $1-\cos 1$

(c) $1+\cos 1$

(d) $\frac{1-\cos 1}{2}$

Q2. The value of the integral $\int_{y=0}^{1}\int_{x=0}^{1-y^2} y\sin(\pi(1-x)^2)\,dx\,dy$ is

JAM-2019

(a) $\frac{1}{2\pi}$

(b) 2π

(c) $\pi/2$

(d) $2/\pi$

Q.3. The value of integral $\int_0^1 \int_x^1 y^4 e^{xy^2} \, dy dx$ is **JAM – 2018**

(a) $\frac{e+1}{2}$ (b) $\frac{e-1}{2}$

(c) $\frac{e-2}{3}$ (d) $\frac{e+2}{3}$

Q.4. The value of double integral $\int_0^{\pi}\int_0^{x} \frac{\sin y}{\pi - y}\,dy\,dx$. **JAM-2016**

(a) 0 (b) 1

(c) 2 (d) 2π

Q.5. The value of $\int_{0}^{4}\int_{\sqrt{4-x}}^{2} e^{y^3}\,dy\,dx$. **JAM-2012**

(a) $e^8 + 1$

(b) $e^8 - 1$

(c) $\dfrac{e^8 - 1}{2}$

(d) $\dfrac{e^8 - 1}{3}$

Q.6. After the change of order of integration ,the double integral $\int_0^8 \int_{x^{1/3}}^2 dy dx$ becomes **CUCET 2021**

(a) $\int_{x^{1/3}}^2 \int_0^8 dx dy$

(b) $\int_0^2 \int_0^{y^3} dx dy$

(c) $\int_8^0 \int_2^{x^{1/3}} dx dy$

(d) $\int_0^2 \int_{y^3}^0 dx dy$

Q.7. Let f : R →R be continuous function and a > 0 then the integral $\int_0^a \int_0^x f(y)\,dy\,dx$ equals

(a) $\int_0^a y f(y)\,dy$ (b) $\int_0^a (a-y) f(y)\,dy$

(c) $\int_0^a (y-a) f(y)\,dy$ (d) $\int_a^0 y f(y)\,dy$