

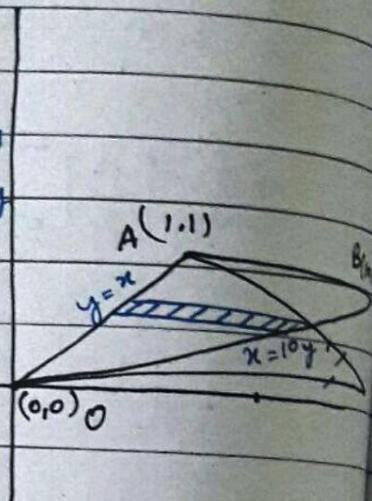
Ans: Evaluate $\iint_S \sqrt{xy-y^2} \, dx \, dy$, where 'S' is a triangle with vertices $(0,0)$, $(10,1)$ and $(1,1)$.

Equation of line AB $OA \Rightarrow y=x$

$$\Rightarrow \int_0^1 \int_y^{10y} \sqrt{xy-y^2} \, dx \, dy \Rightarrow \int_0^1 \left[\frac{2}{3} \sqrt{y} (x-y)^{3/2} \right]_y^{10y} dy$$

$$\Rightarrow \int_0^1 \frac{2}{3} \sqrt{y} (9y)^{3/2} dy$$

$$\Rightarrow 18 \int_0^1 y^2 dy \Rightarrow 18 \left[\frac{y^3}{3} \right]_0^1 \Rightarrow 6.$$



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Ques: Let D be the region in first quadrant bounded by the curve $xy=16$, $x=y$, $y=0$ and $x=8$. Sketch the region of integration of the following integral $\iint_D x^2 \, dx \, dy$ and evaluate it by representing it as D an appropriate repeated integral.

$$\Rightarrow \iint_D x^2 \, dx \, dy$$

$$\Rightarrow \int_0^4 \int_0^x x^2 \, dy \, dx + \int_4^8 \int_0^{16/x} x^2 \, dy \, dx$$

$$\Rightarrow \int_0^4 [x^2 y]_0^x \, dx + \int_4^8 [x^2 y]_0^{16/x} \, dx$$

$$\int_0^4 x^3 \, dx + \int_4^8 x^2 \times \frac{16}{x} \, dx$$

$$\Rightarrow \left[\frac{x^4}{4} \right]_0^4 + 8 \left[x^2 \right]_4^8$$

$$\Rightarrow 64 + 8[64 - 16] \Rightarrow 64 + 48 \times 8$$

$$\Rightarrow 384 + 64$$

$$Ans: \Rightarrow 448$$

