

q13 Rahul Paleja

① change The order of integration in: section 22

$$\int_{y=1}^y \int_{x=0}^{\ln(y)=x} f(x,y) dx dy$$

Answer:

$$\int_0^{e^x} \int_1^y f(x,y) dy dx$$

② Evaluate $\int_0^2 \int_{y/2}^1 \frac{1}{(x^2+1)^2} dx dy$

By Inverting order of integration & evaluating new integral

$$\int_1^2 \int_0^{2x} \frac{1}{(x^2+1)^2} dy dx$$

$$\int_1^2 \frac{2x}{(x^2+1)^2} dx$$

$$u = x^2 + 1 \\ du = 2x dx$$

$$\int_1^2 u^{-2} \cdot du = \left[-\frac{1}{u} \right]_1^2$$

$$\left[\frac{-1}{x^2+1} \right]_1^2 = -\frac{1}{5} - \left(\frac{-1}{2} \right) = \frac{-2}{10} + \frac{5}{10} = \frac{3}{10}$$