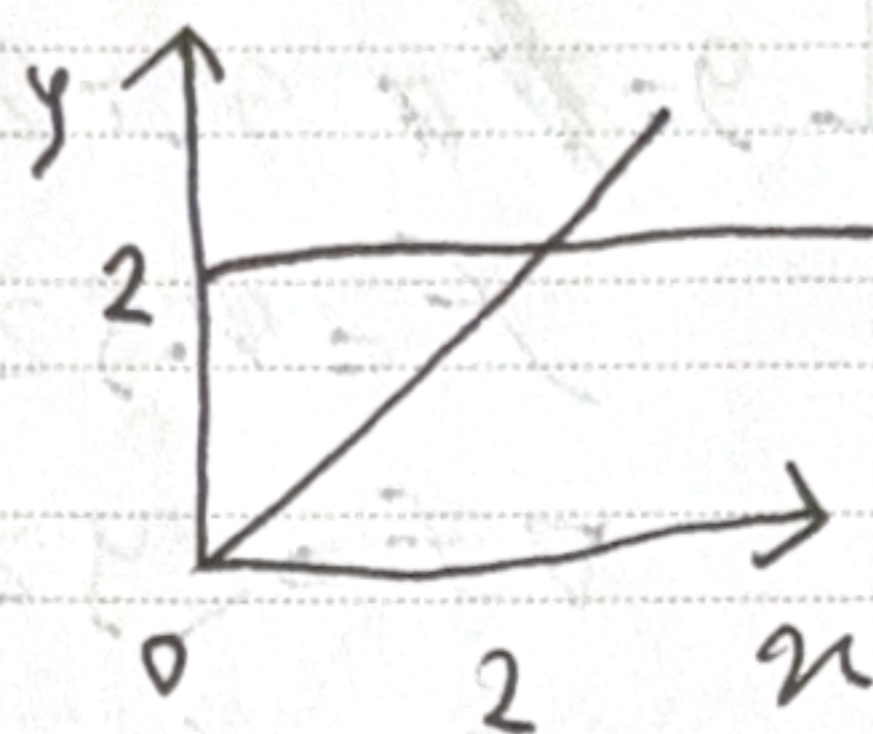$$\int_0^2 \int_x^2 e^{-y^2} \, dy \, dx$$

chane order

$$\int_0^2 \int_0^y e^{-y^2} \, dx \, dy$$

Inner:

$$e^{-y^2} x \Big|_0^y = y e^{-y^2}$$

outer: $\int_0^2 y e^{-y^2} = \dfrac{-e^{-y^2}}{2} \Big|_0^2$

$$= \frac{1}{2}(1 - e^{-4}) \approx \frac{1}{2}$$