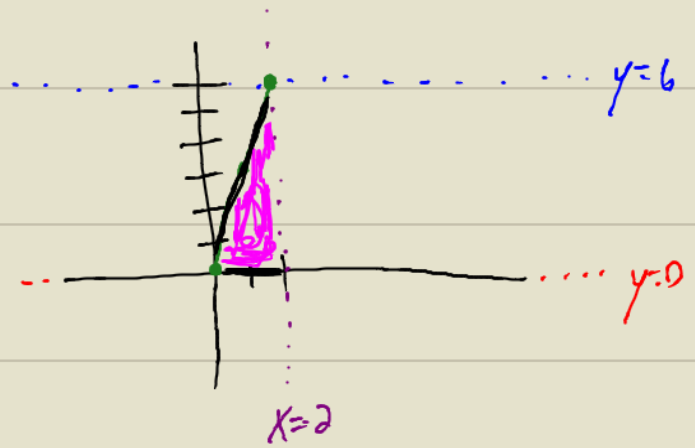
8. $\int_{y=0}^{y=6} \int_{x=\frac{y}{3}}^{x=2} (e^{x^2})\, dx\, dy$



$x = \frac{y}{3}$

$3x = y$

$= \int_{x=0}^{x=2} \int_{y=0}^{y=3x} (e^{x^2})\, dy\, dx$

$= \int_{x=0}^{x=2} \left[y e^{x^2} \right]_{y=0}^{y=3x} dx$

$= \int_{x=0}^{x=2} \left[3x e^{x^2} - 0 e^{x^2} \right] dx$

$= 3 \int_{x=0}^{x=2} (x e^{x^2})\, dx$

$u = x^2 \quad du = 2x\, dx$

$= 3 \cdot \frac{1}{2} \int_{x=0}^{x=2} (2x e^{x^2})\, dx$

$= \frac{3}{2} \int_{x=0}^{x=2} e^u\, du$

$= \frac{3}{2} \left[e^u \right]_{x=0}^{x=2}$

$= \frac{3}{2} \left[e^{x^2} \right]_{x=0}^{x=2}$

$= \frac{3}{2} \left[e^{2^2} - e^{0^2} \right]$

$= \frac{3}{2} \left[e^4 - 1 \right]$