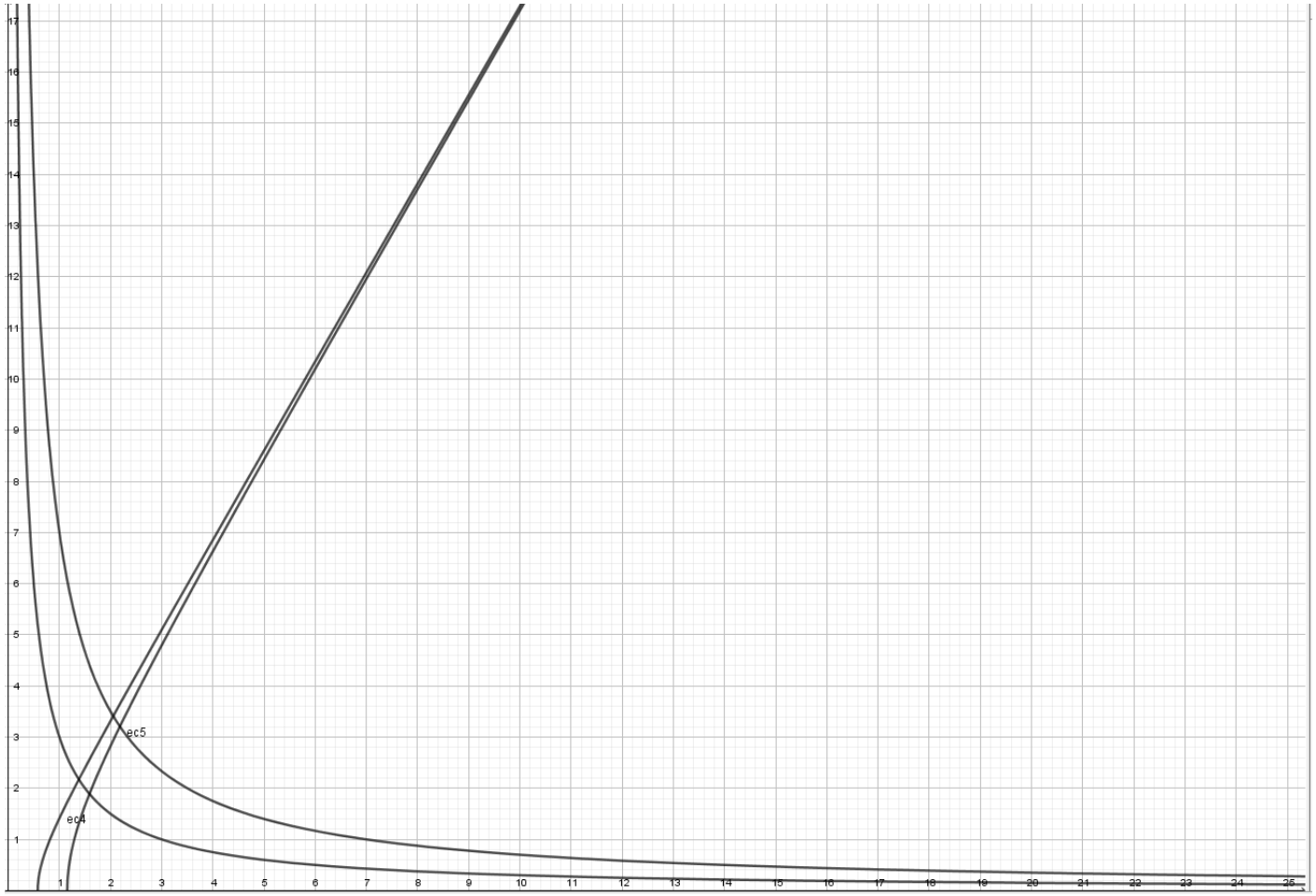
Grafica de Region R

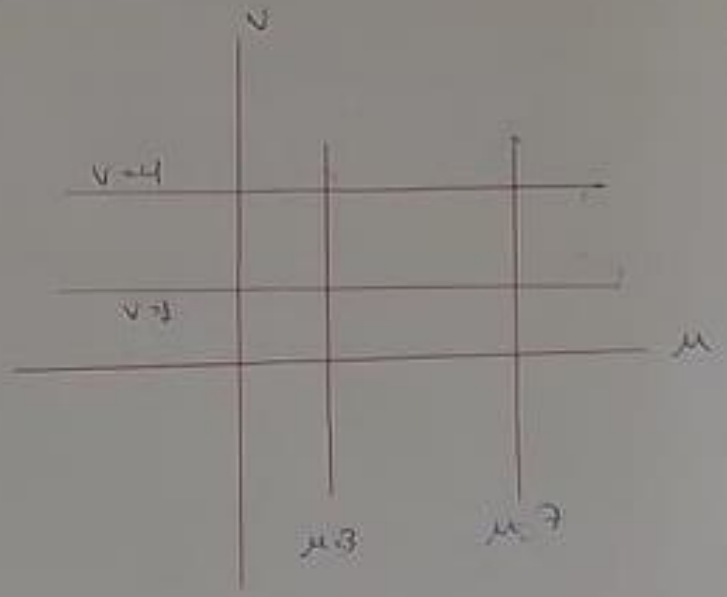


$$\int_R \int (3x^2 + y^2) e^{5xy} \, dx \, dy$$

$R = \{ (x,y) \in \mathbb{R}^2 \ / \ xy = 3, \ xy = 7, \ 3x^2 - y^2 = 1, \ 3x^2 - y^2 = 4, \ (x,y) \text{ en el primer cuadrante} \}$

$$u = xy$$
$$v = 3x^2 - y^2$$

$$3 \leq u \leq 7$$
$$1 \leq v \leq 4$$



$$J(u,v) = \frac{1}{J(x,y)}$$

$$J(x,y) = \begin{vmatrix} y & x \\ 6x & -2y \end{vmatrix} = -2y^2 - 6x^2$$

$$\int_1^4 \int_3^7 (3x^2+y^2)\, e^{5xy} \cdot |J(u,v)|\, du\, dv$$

$$\int_1^4 \int_3^7 (3x^2+y^2)\, e^{5xy} \cdot \left| \frac{1}{-2(3x^2+y^2)} \right| du\, dv$$

$$\int_1^4 \int_3^7 \frac{1}{2} e^{5xy}\, du\, dv$$

$$\int_1^4 \int_3^7 \frac{1}{2} \cdot e^{5u}\, du\, dv$$

$$\frac{1}{5} \cdot \frac{1}{2} \int_1^4 \int_3^7 e^{5u} \cdot 5\, du\, dv$$

$$\frac{1}{10} \int_1^4 e^{5u} \Big|_3^7 dv = \frac{1}{10} \int_1^4 e^{35} - e^{15}\, dv$$

Rpta: $\dfrac{3(e^{35} - e^{15})}{10}$ //