Es. 4

$$I = \iint_T x^2(y-2x^3)\, e^{y+2x^3}\, dx\, dy$$

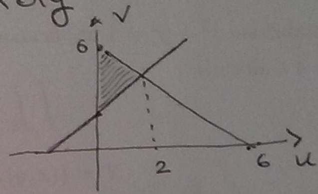
$$T = \{(x,y) \in \mathbb{R}^2 \quad 2x^3 \le y \le 3 \quad 2x^3 \geq 1\}$$

$$\begin{cases} u = y-2x^3 \\ v = y+2x^3 \end{cases}$$

$$\frac{\partial u}{\partial x} = -6x^2 \qquad \frac{\partial u}{\partial y} = 1 \qquad \begin{pmatrix} -6x^2 & 1 \\ 6x^2 & 1 \end{pmatrix} = -12x^2$$

$$\frac{\partial v}{\partial x} = 6x^2 \qquad \frac{\partial v}{\partial y} = 1$$

$$|J| = 12x^2 \Rightarrow du\,dv = 12x^2\, dx\, dy$$



$$y-2x^3 \geq 0 \Rightarrow u \geq 0$$

$$\frac{u+v}{2} \le 3 \qquad \frac{v-u}{2} \geq 1$$

$\cancel{u \le 6-v}$

$$v \le 6-u \qquad v \geq 2+u \qquad T' = \{(u,v):\ 0 \le u \le 2 \quad 2+u \le v \le 6-u\}$$

$$6-u = 2+u \qquad 4 = 2u \qquad u=2$$

$$I = \frac{1}{12}\int_0^2 du \int_{2+u}^{6-u} dv\, u\, e^v = \int_0^2 du\, u\left(e^{6-u} - e^{2+u}\right) =$$

$$= \frac{1}{12}\left(e^6 \int_0^2 u\, e^{-u} du - e^2 \int_0^2 u\, e^u du = \right)$$

$$= \frac{e^6}{12}\left(-e^{-u}u\Big|_0^2 + \int_0^2 e^{-u} du\right) - \frac{e^2}{12}\left(u\, e^u\Big|_0^2 - \int_0^2 e^u du\right) =$$

$$= \frac{e^6}{12}\left(-e^{-2}2 - (e^{-2}-1)\right) - \frac{e^2}{12}\left(2e^2 - (e^2-1)\right) =$$

$$= \frac{1}{16}\left(-2e^4 - \cancel{e^4} + e^6 - 2e^4 \cancel{+e^4} - e^2\right) = \frac{-4e^4 + e^6 - e^2}{12}$$