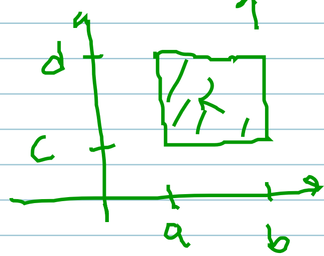
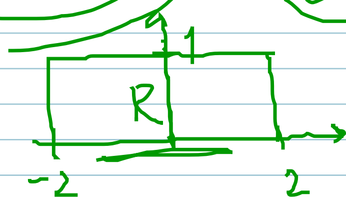
Dobbeltintegraler over et rektangel

$$\iint_R f(x,y)\,dA \qquad R=[a,b]\times[c,d]$$



$$\int_a^b \int_c^d f(x,y)\,dy\,dx = \int_c^d \int_a^b f(x,y)\,dx\,dy$$



$$f(x,y)=x^2e^y$$

$$\int_0^1 \int_{-2}^{2} x^2e^y\,dx\,dy$$

$$\int_{-2}^{2} \int_0^1 x^2e^y\,dy\,dx$$

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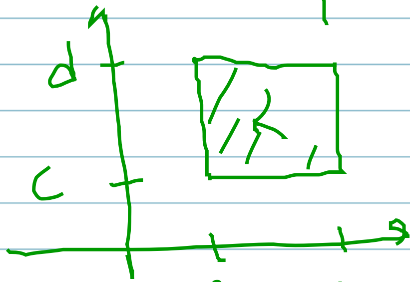

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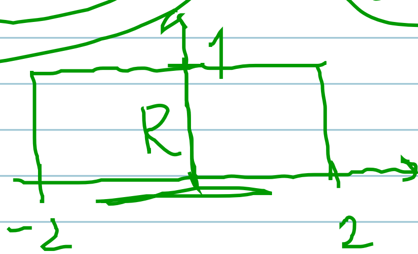

$f(x,y)=x^2e^y$

$$\int_0^1 \int_{-2}^2 x^2 e^y\,dx\,dy$$

$$\int_{-2}^2 \int_0^1 x^2 e^y\,dy\,dx$$

$$\int_0^1 \int_{-2}^{2} x^2 e^y \, dx \, dy = \int_0^1 \left[\frac{1}{3}x^3 e^y\right]_{x=-2}^{x=2} dy$$

$$= \int_0^1 \frac{1}{3} \cdot \underbrace{2^3}_{8} e^y - \frac{1}{3}\underbrace{(-2)^3}_{-8} e^y \, dy = \int_0^1 \frac{16}{3} e^y \, dy$$

$$= \left[\frac{16}{3} e^y\right]_0^1 = \frac{16}{3} e - \frac{16}{3} 1 = \frac{16}{3}(e-1)$$

$$\int_{-2}^{2} \int_0^1 x^2 e^y \, dy \, dx = \int_{-2}^{2} \left[x^2 e^y\right]_{y=0}^{y=1} dx$$

$$= \int_{-2}^{2} x^2 e - x^2 \, dx = \int_{-2}^{2} x^2(e-1) \, dx =$$

$$\left[\frac{1}{3}x^3(e-1)\right]_{x=-2}^{2} = \frac{16}{3}(e-1)$$