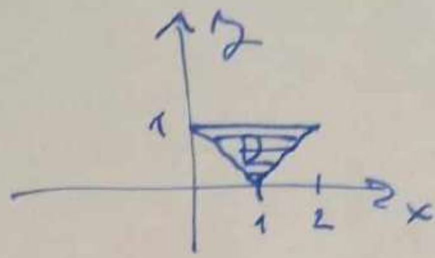
$\boxed{13/1}$

$$\iint_D \frac{x^2}{1+y^2}\,dx\,dy = \int_0^1 x^2\,dx \int_0^1 \frac{1}{1+y^2}\,dy = \left[\frac{x^3}{3}\right]_0^1 \left[\operatorname{arctg} y\right]_0^1 = \underline{\underline{\frac{\pi}{12}}}$$

$\boxed{13/2}$

$$\iint_D e^{x-y}\,dx\,dy =$$



$y > x-1$ $\quad y > 1-x$

$y+1 > x$ $\quad x > 1-y$

$$= \int_0^1 \left(\int_{1-y}^{y+1} e^{x-y}\,dx \right) dy =$$

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

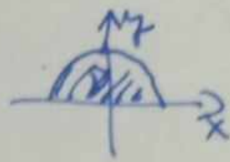
$$= \left[e\cdot y + \frac{1}{2} e^{1-2y} \right]_0^1 = e + \frac{1}{2} e^{-1} - \frac{1}{2} e = \underline{\underline{\frac{1}{2}(e+e^{-1})}}$$

(2. POŘADÍ $\quad \iint_D e^{x-y}\,dx\,dy = \int_0^1 \left(\int_{x-1}^1 e^{x-y}\,dy \right) dx + \int_1^2 \left(\int_{1-x}^1 e^{x-y}\,dy \right) dx$)

$\boxed{13/3}$

$$D = \{(x,y) \in \mathbb{R}^2 \mid y \geq 0 \wedge x^2+y^2 \leq 4\}$$

$$V = \iint_D y + x^2 \, dx dy = .$$



POL. SOUŘADNICE

$$= \int_0^{\pi} \int_0^{2} \left(r \cdot \sin\varphi + r^2 \cos^2\varphi\right) \cdot r \, dr \, d\varphi =$$

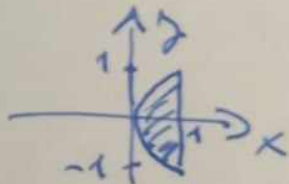
$$= \int_0^{\pi} \left[\frac{r^3}{3} \sin\varphi + \frac{r^4}{4} \cos^2\varphi \right]_{r=0}^{2} d\varphi = \int_0^{\pi} \frac{8}{3} \sin\varphi + 4\cos^2\varphi \, d\varphi$$

$$= \frac{8}{3} \int_0^{\pi} \sin\varphi \, d\varphi + 2 \int_0^{\pi} 1 + \cos(2x) \, dx = \frac{8}{3} \left[-\cos\varphi\right]_0^{\pi} + 2 \left[x + \frac{\sin(2x)}{2}\right]_0^{\pi} =$$

$$= \frac{8}{3} \cdot (1+1) + 2 \cdot (\pi) = \underline{\underline{\frac{16}{3} + 2\pi}} \ \left(j^3\right)$$

$\boxed{13/5}$

$$\int_{-1}^{1} \left(\int_{y^2}^{1} 6 \left(\sqrt{x} + y\right)^5 dx \right) dy =$$

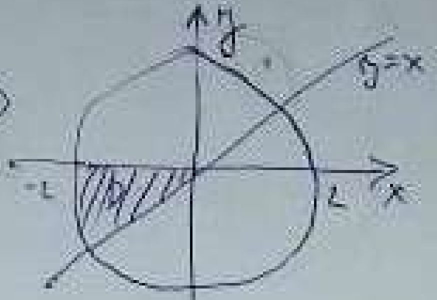


$$= \int_0^1 \left(\int_{-\sqrt{x}}^{\sqrt{x}} 6 \left(\sqrt{x} + y\right)^5 dy \right) dx = \int_0^1 \left[\left(\sqrt{x} + y\right)^6 \right]_{y=-\sqrt{x}}^{\sqrt{x}} dx =$$

$$= \int_0^1 \left(2\sqrt{x}\right)^6 dx = \int_0^1 64 \cdot x^3 \, dx = \left[\frac{64}{4} x^4\right]_0^1 = \underline{\underline{16}}$$

$\boxed{12/1}$ $\iint\limits_D \frac{x^2 y}{x^2+y^2}\,dx\,dy$, $D=\{(x,y)\in\mathbb{R}^2, x\le y<0, x^2+y^2\le 4\}$

$H=\langle 0,2\rangle\times\langle \pi,\frac{5\pi}{4}\rangle \xrightarrow{\Phi}$



$\Phi: x = r\cos\varphi$

$y = r\sin\varphi$

$J_\Phi = r$

$$\iint\limits_D \frac{x^2 y}{x^2+y^2}\,dx\,dy = \iint\limits_H \frac{r^2\cos^2\varphi\cdot r\cdot\sin\varphi}{r^2\cdot(\cos^2\varphi+\sin^2\varphi)}\cdot r\,dr\,d\varphi =$$

$$= \int_0^2\int_\pi^{\frac{5\pi}{4}} r^2\cdot\cos^2\varphi\cdot\sin\varphi\,d\varphi\,dr = \int_0^2 r^2\,dr\cdot\int_\pi^{\frac{5\pi}{4}}\cos^2\varphi\sin\varphi\,d\varphi$$

$$= \left[\frac{r^3}{3}\right]_0^2\cdot\left[-\frac{\cos^3\varphi}{3}\right]_\pi^{\frac{5\pi}{4}} = \frac{8}{3}\cdot\left(-\frac{1}{3}\right)\cdot\left(\left(-\frac{\sqrt{2}}{2}\right)^3-(-1)^3\right)$$

$$= -\frac{8}{9}\cdot\left(1-\frac{\sqrt{2}}{4}\right) = \frac{8(\sqrt{2}-4)}{9\cdot 4} = \underline{\underline{\frac{1}{9}\cdot\left(2\sqrt{2}-8\right)}}$$