Aalto university
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Hand-in exercises 3
Differential and integral calculus 3, MS-A0311.
Submit your solutions on MyCourses by **Wednesday, March 24th 2021 23.59**.

(1) Calculate

$$\oint_\gamma x \, dy$$

where γ is the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

($a > 0$ and $b > 0$) counterclockwise. (6*p*)

(2) Calculate

$$\iint_{\mathcal{S}} x \, dS$$

where $\mathcal{S}$ is the part of $z = x^2$ above the rectangle

$$\{(x, y, 0) \in \mathbb{R}^3; 0 \leq x \leq 2, 0 \leq y \leq 3\}.$$

(6p)

(3) Calculate the flux of $F(x, y, z) = (xy, 0, -1)$ outward (away from the z-axis) through the cone $z^2 = x^2 + y^2$ where $0 \leq z \leq 1$. (6p)

(4) Calculate the flux of

$$F(x, y, z) = (z^2, x, -3z)$$

outward through the surface cut from the parabolic cylinder $z = 4 - y^2$ by the planes $x = 0$, $x = 1$, and $z = 0$. (6*p*)