Aalto university
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  noindent **Homework 2, due Monday 22th March 2021 at 23:59.**
Differential and integral calculus 3, MS-A0311.

The solutions will be presented Tuesday 23.3 or Wednesday 24.3.

(1) Calculate
$$\int_{\gamma} x^2 \, ds$$
where γ is the line from the origin to $(3, 1, -2)$.

(4p)

(2) Let $F(x, y, z) = (y^2 \cos x + z^3, 2y \sin x - 4, 3xz^2 + 2)$. Calculate
$$\int_{\gamma} F \cdot d\vec{r}$$
where $\gamma(t) = (\arcsin t, 1 - 2t, 3t - 1)$, $0 \leq t \leq 1$.

(4p)

(3) Find the surface area of the part of the sphere defined as
$$\mathcal{S} = \left\{ (x, y, z) \in \mathbb{R}^3 ; x^2 + y^2 + z^2 = 2, x^2 + y^2 \leq 1, \text{ and } z \geq 0 \right\}.$$

(4p)