Fachbereich Mathematik
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11th Homework Sheet Analysis II (engl.)
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(**H11.1**) Using the method of Lagrange multipliers, find the maximum and minimum values of the function $f(x, y, z) = xyz$ on the surface given by $x^2 + 2y^2 + 3z^2 = 6$.

(**H11.2**) Find the radius and height of the circular cylinder which is closed at the bottom and open at the top, whose volume is 80 cubic centimeters, and whose surface area is minimized.

(**H11.3**) Consider the following surfaces is $\mathbb{R}^3$:

i. The ellipsoid $x^2 + \frac{1}{4}y^2 + \frac{1}{9}z^2 = 1$.

ii. The cone $z = \sqrt{x^2 + y^2} + 3$.

iii. The paraboloid $z = x^2 - 2x + y^2 + 4y + 2$.

Decide which of these surfaces are 2-dimensional manifolds. For those that are manifolds, exhibit the surface in the form $S = f^{-1}(c)$, where $f : \mathbb{R}^3 \to \mathbb{R}$ is a continuously differentiable function, and c is a regular value.