

## Analysis III for Engineering Students

### Work Sheet 6

#### Exercise 1:

Compute the following integrals:

a)  $\int_0^1 \int_0^2 (2x + y)^2 dy dx,$

b)  $\int_R \frac{1}{xy^2 + x} d(x, y)$  with  $R = [1, 2] \times [0, 1],$

c)  $\int_Q \cos y + y\sqrt{x+z} d(x, y, z)$  with  $Q = [0, 2] \times [0, \pi] \times [1, 2].$

#### Exercise 2:

a) Draw the closed area  $K$  given by  $x \leq 0, y \leq 0, 0 \leq z$  and  $x^2 + y^2 + z^2 = 9$  and represent it as a “normal” area.

b) Compute  $\int_K 8yz d(x, y, z).$

#### Exercise 3:

Given a rotational paraboloid  $P$  by  $x^2 + y^2 \leq 4$  and  $0 \leq z \leq 4 - x^2 - y^2$ .  $P$  has a constant density  $\rho$ .

a) Plot  $P$  using the MATLAB-function 'ezgraph3'.

b) For  $P$  compute the mass and moment of inertia with respect to the  $z$  axis.

c) Compute the moment of inertia of  $P$  with respect to the axis  $D$ , parallel to the  $z$  axis, passing through the point  $(1, 1, 5)^T$ .