

# Self-study session 3, Calculus

First year mathematics for the technology and science programmes  
Aalborg University

This self-study session is concerned with the application of plane integrals to calculate mass and center of mass for laminas (thin plates). The calculation of mass and center of mass for more general spatial bodies is treated later on in the course through space integrals.

## Agenda for the day

Read section 13.5 in E&P (skip from p.1031 to p.1033 example 8 included) about applications of plane integrals.

Afterwards, solve the following exercises.

## Exercises

- Section 13.5 true/false study guide (Questions related to Pappus' theorem are skipped), p. 1035.
- Section 13.5, exercises: 3, 5, 9, 11, 13, 17, 23, 29 & 35.

## Maple/Matlab

Maple and Matlab can be used to evaluate plane integrals once the integrals are rewritten as iterated integrals. As an example consider

$$\int_1^2 \int_0^x x^2 y^3 dy dx.$$

In Maple this integral is evaluated using the command

```
> int(x^2*y^3, y = 0..x, x = 1..2);
```

In MATLAB use the commands

```
syms x,y  
int(int(x^2*y^3,y,0,x),x,1,2).
```