Exercise Sheet 9

More integration methods, Storrer 13

Hand in: Wednesday, **22.11.2017**, ahead of the lecture.

MUST

Exercise 1

a) Compute the following integrals.

1) $\int_{-3}^{3} x^2 dx$

2) $\int_{-\pi}^{\pi} \sin(x) dx$

3) $\int_{-\pi}^{\pi} \cos(x) dx$

b) Compute the following integral $\int \sin(x) \cdot \cos(x) dx$ using integration by parts and the substitution method.

STANDARD

Exercise 2 (5 points)

Compute the following indefinite integrals.

a) (1 point) $\int \frac{x^3+1}{\sqrt{x}} dx$

b) (1 point) $\int \frac{dx}{x \ln(x)}$

c) (1 point) $\int x^3 (x^4+1)^{100} dx$

d) (1 point) $\int \frac{x+1}{x^2+2x} dx$

e) (1 point) $\int e^{x-e^x} dx$

Exercise 3 (6 points)
Compute the following integrals.

a) (1 point) $\int_{-3}^{3} x \cdot e^{-|x|}\, dx$

b) (2 points) $\int x \sin(x)\, dx$

c) (2 points) $\int x^2 \sin(x)\, dx$

d) (1 point) Is it necessary to compute the integral explicitly to find the value $\int_{-2}^{2} x^2 \sin(x)\, dx$? If yes, take the result from subtask c), otherwise give an explainatio of how to find the value alternatively.

Exercise 4 (2 points)
Apply integration by parts to determine the integral

$$\int x \ln(x) dx$$

in two different ways:

1) (1 point) $u'(x) = x$ und $v(x) = \ln(x)$

2) (1 point) $u'(x) = \ln(x)$ und $v(x) = x$

HONOURS

Exercise 5 (4 points)
Compute the area bounded by the graph of the function $f(x) = \frac{1}{16}x^3 - \frac{3}{8}x^2 + 4$, the tangent line in the inflection point and the axes.

a) (2 points) Draw the graph of the function $f(x)$. Compute extrema and intersection points, whenever such points exist.
hint concerning the graph: The root is close to $x \approx -2,71$.

b) (2 points) Compute the area.