

Übungsblatt 1

Fach:	<i>Mathematik</i>	Thema:	<i>Integrationsregeln</i>
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Erstellt am:	<i>3.9.11</i>	Kurs:	<i>LK M 11</i>

Berechne die folgenden Integrale. (Anleitung: Fasse zuerst zu einem möglichst einfachen Integral zusammen.)

- 1 a) $\int_0^1 (2-x) dx + \int_0^1 (2x-2) dx$ b) $\int_{-1}^2 (x^2-1) dx - \int_{-1}^2 (1-x)^2 dx$ c) $\int_1^2 \frac{x-1}{x^2} dx - \int_1^2 \frac{x+1}{x^2} dx$
- d) $\int_0^2 \frac{1+2x}{\sqrt{x+1}} dx - \int_0^1 \frac{2+2x}{\sqrt{x+1}} dx$ e) $\int_1^4 (1+\sqrt{x})^2 dx - \int_1^4 (1+\sqrt{x}) dx$ f) $\int_0^1 (x^3-2x) dx + \int_0^1 x(2-x^2) dx$
- 2 a) $\int_1^3 (x^2+1-2x) dx + \int_1^3 (x-1)^2 dx$ b) $\int_0^1 |x-1| dx + \int_0^1 (1-x) dx$ c) $\int_0^{\frac{\pi}{2}} \sin x dx + \int_0^{\frac{\pi}{2}} \sin(\pi-x) dx$
- 3 a) $3 \int_{-1}^1 (x^2-2x) dx - 2 \int_{-1}^1 (2x-x^2) dx$ b) $\frac{1}{2} \int_{-2}^{-1} \frac{1}{x^2} dx + \frac{1}{3} \int_{-2}^{-1} \frac{2}{x^2} dx$ c) $\frac{1}{4} \int_1^2 \frac{2-4x^2}{x^2} dx + \frac{1}{5} \int_1^2 (2-\frac{1}{x^2}) dx$
- d) $\frac{1}{2} \int_1^2 \frac{6-2\sqrt{x}}{\sqrt{x}} dx - \frac{2}{5} \int_1^2 (\frac{12}{\sqrt{x}}-4) dx$ e) $\int_1^2 \frac{3x^3-8}{4x^2} dx - \frac{1}{2} \int_1^2 (\frac{2}{x^2}-\frac{3x}{4}) dx$ f) $4 \cdot \int_1^3 dx + 4 \cdot \int_1^3 (t^2-1) dt$
- 4 a) $3 \cdot \int_0^1 x^2 dx + 2 \cdot \int_1^2 x^2 dx - \int_0^1 x^2 dx$ b) $\int_1^4 (1-\frac{2}{\sqrt{x}}) dx + 2 \cdot \int_1^4 \frac{1}{\sqrt{r}} dr + \int_4^9 ds$

- 5 a) $\int_{-1}^2 (x^2+4x+2) dx + \int_2^3 (x^2+4x+2) dx$
- b) $\int_{-2}^1 (3x^2+5x-4) dx + \int_1^4 (3x^2+5x-4) dx$

Beispiel

$$\begin{aligned}
 & \int_1^2 (2x - \frac{1}{x}) dx - \int_1^2 (\frac{1}{x} + 2x^2) dx \\
 &= \int_1^2 (2x + \frac{1}{x}) dx + \int_1^2 (-\frac{1}{x} - 2x^2) dx = \int_1^2 (2x + \frac{1}{x} - \frac{1}{x} - 2x^2) dx \\
 &= \int_1^2 (2x - 2x^2) dx = 2 \cdot \int_1^2 (x - x^2) dx \\
 &= 2 \cdot \left[\frac{1}{2} x^2 - \frac{1}{3} x^3 \right]_1^2 = 2 \left[\left(\frac{1}{2} \cdot 4 - \frac{1}{3} \cdot 8 \right) - \left(\frac{1}{2} \cdot 1 - \frac{1}{3} \cdot 1 \right) \right] = -\frac{6}{3}
 \end{aligned}$$