

Brückenkurs Mathematik für Studierende der Chemie

Lösungen zu Übung 7

Differentiation

1. (a)	$y = 2$	$y' = 0$
(b)	$y = x$	$y' = 1$
(c)	$y = 3x^3$	$y' = 9x^2$
(d)	$y = x^{-1} = \frac{1}{x}$	$y' = (-1) \cdot x^{-2} = -\frac{1}{x^2}$
(e)	$y = x^{-2} = \frac{1}{x^2}$	$y' = (-2) \cdot x^{-3} = -\frac{2}{x^3}$
(f)	$y = \sqrt{x} = x^{1/2}$	$y' = \frac{1}{2} x^{-1/2} = \frac{1}{2\sqrt{x}}$
(g)	$y = \frac{1}{\sqrt{x}} = x^{-1/2}$	$y' = \left(-\frac{1}{2}\right) x^{-3/2} = -\frac{1}{2\sqrt{x^3}}$
(h)	$y = \sqrt[3]{x^2} = x^{2/3}$	$y' = \frac{2}{3} x^{-1/3} = \frac{2}{3\sqrt[3]{x}}$
(i)	$y = \ln(x)$	$y' = \frac{1}{x}$
(j)	$y = \cos(x)$	$y' = -\sin(x)$
(k)	$y = \tan(x)$	$y' = \frac{1}{\cos^2 x} = 1 + \tan^2(x)$
(l)	$y = 1 + x^7$	$y' = 7x^6$
(m)	$y = x^{-5}$	$y' = (-5) \cdot x^{-6} = -\frac{5}{x^6}$
(n)	$y = \sqrt{x^3} = x^{3/2}$	$y' = \frac{3}{2} x^{1/2} = \frac{3\sqrt{x}}{2}$
(o)	$y = \frac{1}{x^4} = x^{-4}$	$y' = (-4) \cdot x^{-5} = -\frac{4}{x^5}$
(p)	$y = \frac{1}{\sqrt{x^3}} = x^{-3/2}$	$y' = \left(-\frac{3}{2}\right) x^{-5/2} = -\frac{3}{2\sqrt{x^5}}$
(q)	$y = \frac{\sqrt[3]{x}}{\sqrt{x^3}} = x^{(1/3)-(3/2)} = x^{-7/6}$	$y' = \left(-\frac{7}{6}\right) x^{-13/6} = \frac{(-7)}{6\sqrt[6]{x^{13}}} = \frac{(-7)}{6x^2 \sqrt[6]{x}}$

In allen Teilaufgaben ausser (i), (j) und (k) ist die einfache Formel $(x^s)' = s x^{s-1}$ ($s \in \mathbb{Q}$) anzuwenden gewesen.