Sommersemester 2007

3. Übungsserie zur Vorlesung - Lösungen

Gewöhnliche Differentialgleichungen

1. a) $y(x) = c\cos x$ b) $y(x) = c\frac{1}{x} + \frac{x^4}{5}$

   c) $y(x) = c\,(1+x^2) + x(1+x^2)$ d) $y(x) = c\,(\ln x)^2 - \ln x$

   e) $y(x) = \frac{c}{x} + \frac{x^2}{3} + \frac{3x}{2} + 2$ f) $y(x) = \frac{c}{x(x^2+1)} + \frac{\sqrt{x^2+1}}{3x}$

2. a) $y(x) = x^2$

   b) $y(x) = \left(\frac{x^2+1}{2} + \ln(-x)\right) e^x \qquad x < 0$

   c) $y(x) = e^{-\cos x} + 2 - 2\cos x$

   d) $y(x) = -\frac{1}{4x(x-1)} + \frac{1}{x-1} \qquad 0 < x < 1$

3. a) $y(x) = \frac{1}{x} \qquad x > 0$

   b) $y(x) = \frac{3x}{\sqrt{x^2+1}} \qquad -\infty < x < 0$

   c) $y(x) = \frac{x}{1-\sin x} \qquad \frac{\pi}{2} < x < \frac{5\pi}{2}$

   d) $y(x) = \frac{1}{2x - x^2} \qquad 0 < x < 2$

   e) $y(x) = \sqrt[4]{\frac{x^2}{6\cdot 2^5 - 4\,x^5}} \qquad 0 < x < 2\sqrt[5]{1.5}$

4. a) $y(x) = -\frac{2}{x} \qquad 0 < x < \infty$

   b) $y(x) = \frac{4x^2-1}{x-1} \qquad \frac{1}{4} < x < 1$

   c) $y(x) = 2x + \frac{e^{x^2}}{1 - \int_0^x e^{t^2}\,dt} \qquad -\infty < x < D \qquad \text{mit} \qquad 1 = \int_0^D e^{t^2}\,dt$