

## Mathematik III für Wirtschaftsingenieure

### Lösungen 7. Übung

1. a)  $y(x) = C \cdot e^{x^2}$     b)  $y(x) = C \cdot e^x - 1$     c)  $y(x) = \sqrt{2 \ln \frac{e^x+1}{e+1} + 1}$     d)  $y(x) = C(1+x^2)$
2. a) (ii), (iv) und (v)    b)  $y(x) = C_1 \cdot x + C_2 \cdot \frac{1}{x}$ ,  $C_1, C_2 \in \mathbf{R}$
3. a)  $y = x$     b)  $x^3 + 3x^2y^2 + \frac{4}{3}y^3 = C$     c)  $(2x-1)e^{2x+y} = C$     d)  $y = x - \sqrt{x^2 + \frac{2}{x} + 1}$
4.  $t_2 = 40 \text{ min}$
5. a)  $y(x) = 1 + \frac{x^2}{x-1}$     b)  $y(x) \equiv -1$     c)  $y(x) = 4e^{\frac{1}{2}x^2} - 2$   
d)  $y(x) = C \cdot \frac{1}{\sqrt{x^2+2}} + \frac{1}{3}(x^2+2)$ ,  $C \in \mathbf{R}$   
e)  $y = \frac{C}{x} - \cos x + \frac{\sin x}{x}$ ,  $C \in \mathbf{R}$   
f)  $y = \frac{C}{\cos x} + \tan x$ ,  $C \in \mathbf{R}$
6. a)  $y(x) = C_1 \cdot e^{-3x} + C_2 \cdot e^x$ ,  $C_1, C_2 \in \mathbf{R}$   
b)  $y(x) = C_1 + C_2 \cdot e^{-x} + C_3 \cdot e^{2x}$ ,  $C_1, C_2, C_3 \in \mathbf{R}$   
c)  $y(x) = x^2 + C_1 + C_2 \cdot e^x + C_3 \cdot e^{-x}$ ,  $C_1, C_2, C_3 \in \mathbf{R}$   
d)  $y(x) = -\sin x + (C_1 + C_2x)e^{-x} + C_3$ ,  $C_1, C_2, C_3 \in \mathbf{R}$   
e)  $y(x) = C_1e^{2x} + C_2e^{-2x} + C_3 \cos(2x) + C_4 \sin(2x) + \frac{1}{8}x - \frac{1}{16}$ ,  $C_1, C_2, C_3, C_4 \in \mathbf{R}$   
f)  $y(x) = -\frac{1}{6}xe^{2x} \cos(3x) + e^{2x}(C_1 \cos(3x) + C_2 \sin(3x))$ ,  $C_1, C_2 \in \mathbf{R}$   
g)  $y(x) = x$ ,
7. a)  $a_4 = -1$ ,  $a_3 = 1$ ,  $a_2 = -1$ ,  $a_1 = a_0 = 0$   
b)  $y(x) = C_1 + C_2 \cdot x + C_3 \cdot e^x + C_4 \cdot \cos x + C_5 \cdot \sin x$ ,  $C_1, C_2, C_3, C_4, C_5 \in \mathbf{R}$
8. a)  $y' = \frac{2y}{x}$   
b)  $y' = \frac{-x}{2y}$   
c)  $\frac{x^2}{2K^2} + \frac{y^2}{K^2} = 1$