Aufgabe 2

a) $U_m(\theta) = 5\,mA \cdot (R_0 + R_0 A\theta + R_0 B\theta^2) - 10V$

$= 5R_0 + 5R_0 A\theta + 5R_0 B\theta^2 - 10V$

$= 10V + 10V A\theta + 10V B\theta^2 - 10V$

$= 10V A\theta + 10V B\theta^2$

b) $U_m(100°C) = 10V \cdot 0{,}008\,°C^{-1} \cdot 100 + 10V \cdot 2 \cdot 10^{-5}\,°C^{-2} \cdot (100)^2$

$U_m(100°C) = 10V$

c) $E = \frac{\Delta Y}{\Delta x} = \frac{\Delta U_m}{\Delta \theta} = \frac{U_m}{\theta} = \frac{10V}{100°C} = 0{,}1\,V \cdot C^{-1}$

d) $U_m(\theta) = 10V A\theta + 10V B\theta^2$

$\Leftrightarrow 10V A\theta + 10V B\theta^2 - U_m(\theta) = 0$

$\theta_{1,2} = -\frac{A}{2B} \pm \sqrt{\frac{1}{4}\frac{A^2}{B^2} + U_m}$

weil $\theta > 0$ ist, $\theta(U_m) = -\frac{A}{2B} + \sqrt{\frac{A^2}{4B^2} + U_m}$

e) $U_m = 5V \pm 0{,}05$

$\theta = -\frac{0{,}008}{2 \cdot 2 \cdot 10^{-5}} + \sqrt{\frac{(0{,}008)^2}{4 \cdot (2 \cdot 10^{-5})^2} + 5}$