Lösungen zu Extremwertaufgaben VII

1. (a) $A_y(x) = 2\left[x\,y + \frac{V}{y} + \frac{V}{x}\right]$

   (b) $A'_y(x) = 2\left[y - \frac{V}{x^2}\right] = 0 \quad\Longrightarrow\quad x_y = \sqrt{\frac{V}{y}}$

   (c) $F(y) = A_y(x_y) = 2\left[2\sqrt{V}\sqrt{y} + \frac{V}{y}\right]$

   $F'(y) = 2\left[\frac{\sqrt{V}}{\sqrt{y}} - \frac{V}{y^2}\right] = 0 \quad\Longrightarrow\quad y = \sqrt[3]{V}$

   Damit gilt auch $x = x_y = \sqrt[3]{V}$ und $z = \frac{V}{xy} = \sqrt[3]{V}$, Würfel!!

2. $p(x) = x(a-x), \quad p'(x) = a - 2x = 0 \quad\Longrightarrow\quad x = \frac{a}{2}$
   $p''(x) = -2 < 0 \quad\Longrightarrow$ Maximum

3.

   (a) $G(v) = a\,s\,B + b\,s\,B\,v^2 + \frac{c\,s}{v}$

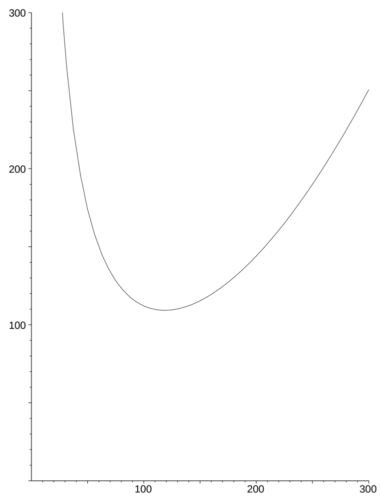
   (b) $G'(v) = 2\,b\,s\,B\,v - \frac{c\,s}{v^2}$

   $G'(v) = 0 \quad\Longrightarrow$

   $v = v_0 = \sqrt[3]{\frac{c}{2\,b\,B}}$

   (c) $v_0 = 118{,}6\,\frac{\text{km}}{\text{h}}$

   $G_0 = G(v_0) = 109{,}21\,\text{DM}$



4. f symmetrisch zur y-Achse. Für $x \geqq 0$ gilt $d = f(x) = a - x^n$. A $(-x\,|\,d)$, B $(x\,|\,d)$
   $F(x) = \frac{1}{2} \cdot 2x \cdot f(x) = a\,x - x^{n+1}$

   $F(x)$ maximal für $x_0 = \sqrt[n]{\frac{a}{n+1}}$, $d_0 = f(x_0) = \frac{n\,a}{n+1}$

Zusammengestellt von OStR M. Ziemke für Landrat-Lucas-Gymnasium, Leverkusen