Lösung Analysis

1.1) $f(x) = ax^3 + bx^2 + cx + d$

$f'(x) = 3ax^2 + 2bx + c$

① Nst. $x=-2$ $\quad f(-2) = 0 \quad 0 = -8a + 4b - 2c + d$

② $E(2/4{,}8)$ $\quad f(2) = 4{,}8 \quad 4{,}8 = 8a + 4b + 2c + d$

③ Horizontalp. $\quad f'(2) = 0 \quad 0 = 12a + 4b + c$

5) ④ Stg $=1$ bei $x=0$ $\quad f'(0) = 1 \quad 1 = c$

1.2)
$$\left.\begin{aligned} 4{,}8 &= 8a + 4b + 2 + d \\ 0 &= -8a + 4b - 2 + d \end{aligned}\right\} -$$

$4{,}8 = 16a + 4 \quad \Rightarrow 0{,}8 = 16a \quad \Rightarrow a = \frac{1}{20}$

in ③ $\quad 0 = \frac{12}{20} + 4b + 1 \quad \Rightarrow 4b = -\frac{32}{20} \quad \Rightarrow b = -\frac{2}{5}$

in ① $\quad 0 = -\frac{8}{20} - \frac{8}{5} - 2 + d \quad \Rightarrow d = 4$

$\Rightarrow f(x) = \frac{1}{20}x^3 - \frac{2}{5}x^2 + x + 4$

2.1) $x + 1{,}5x + h = 1{,}20 \quad \Rightarrow h = 1{,}20 - 2{,}5x$

$V(x) = x \cdot 1{,}5x \cdot (1{,}20 - 2{,}5x)$

4) $\quad = 1{,}5x^2(1{,}20 - 2{,}5x) = 1{,}8x^2 - 3{,}75x^3$

2.2) $1{,}5x \le 70 \quad \Rightarrow x \le 46\frac{2}{3}$

$h \le 70 \quad \Rightarrow 2{,}5x \ge 50 \quad x \ge 20$ (mm!)

2.3) $V'(x) = 3{,}6x - 11{,}25x^2 = 0$

$x(3{,}6 - 11{,}25x) = 0 \qquad (x_1 = 0 \notin D)$

$11{,}25x = 3{,}6 \qquad x_2 = 0{,}32$ (in m!)

$V''(x) = 3{,}6 - 22{,}5x$

$V''(0{,}32) = 3{,}6 - 22{,}5 \cdot 0{,}32 < 0 \Rightarrow$ Maximum

$V(0{,}32) = 1{,}5 \cdot 0{,}32^2 (1{,}20 - 2{,}5 \cdot 0{,}32) = 0{,}06144 \; (m^3)$

$V(0{,}20) = 0{,}042 \qquad V(0{,}467) = 0{,}011$

6) Randwerte sind kleiner

oder Monotonie: V streng mon st. in $[0/0{,}32]$

" " fallend in $[0{,}32/\infty[$