

# Lösungen PV 2 - 2012

① PV2

## Aufgabe 1

a)  $k'(x) = 6x^2 - 36x + 60$   
 $k''(x) = 12x - 36$   
 $k'''(x) = 12$

$k''(x) = 0$  und  $k'''(x) \neq 0$

$0 = 12x - 36$

$12x = 36$

$x = 3 \text{ ME}$

$k'''(3) = 12 > 0$   
 $\Rightarrow \text{Min}$

$k'(3) = 6 \text{ GE}$

$GK_{\min}(3|6)$

b)

$G(x) = E(x) - K(x)$

$E(x) = p(x) \cdot x$

$E(x) = -12x^2 + 156x$

$G(x) = -12x^2 + 156x - (2x^3 - 18x^2 + 60x + 200)$

$G(x) = -12x^2 + 156x - 2x^3 + 18x^2 - 60x - 200$

$G(x) = -2x^3 + 6x^2 + 96x - 200$

$G(x) = 0$

$0 = -2x^3 + 6x^2 + 96x - 200 \quad | : (-2)$

$0 = x^3 - 3x^2 - 48x + 100 \quad \underline{x_1 = 2 \text{ ME}}$

$(x^3 - 3x^2 - 48x + 100) : (x - 2) = x^2 - 1x - 50$   
 $-(x^3 - 2x^2)$

$-1x^2 - 48x$

$-(-1x^2 + 2x)$

$-50x + 100$

$-(50x + 100)$

0

$x^2 - 1x - 50 = 0$

$x_{2/3} = 0,5 \pm \sqrt{0,25 + 50}$

$x = 7,6 \text{ ME}$

$x_3 = -6,6$

$GS = 2 \text{ ME} \quad GG = 7,6 \text{ ME}$

Gewinnzone =  $GG - GS$

$= 7,6 - 2 = 5,6 \text{ ME}$

c)  $G'(x) = 0$  und  $G''(x) \neq 0$

$$G'(x) = -6x^2 + 12x + 96$$

$$G''(x) = -12x + 12$$

$$0 = -6x^2 + 12x + 96 \quad | :(-6)$$

$$0 = x^2 - 2x - 16$$

$$x_{1/2} = +1 \pm \sqrt{1 + 16}$$

$$G''(5,1) = -49,2 < 0 \Rightarrow \text{Max}$$

$$x_1 = 5,1 \text{ ME} \quad \text{X}_{G\text{max}}$$

$$x_2 = -3,1$$

$$G(5,1) = \underline{\underline{180,4 \text{ GE}}}$$

$$P(5,1) = \underline{\underline{84,8 \text{ GE}}}$$

$$\underline{\underline{C(5,1 | 84,8)}}$$

d)

$$E(x) = -12x^2 + 156x$$

$$E'(x) = -24x + 156$$

$$E''(x) = -24$$

$$E'(x) = 0 \text{ und } E''(x) \neq 0$$

$$0 = -24x + 156$$

$$24x = 156$$

$$x = \underline{\underline{6,5 \text{ ME}}}$$

$$E''(6,5) = -24 < 0$$

$\Rightarrow \text{Max}$

$$K(6,5) = \underline{\underline{378,75 \text{ GE}}}$$

$$\text{Stückkosten} = \frac{K(x)}{x}$$

$$= \frac{378,75}{6,5} = \underline{\underline{58,3 \text{ GE}}}$$

## Aufgabe 2

a)  $E(x) = -50x^2 + 550x$

$$P(x) = -50x + 550$$

$$\underline{\underline{P(x) = 0}}$$

$$0 = -50x + 550$$

$$50x = 550$$

$$\underline{\underline{x = 11 \text{ ME}}} \quad \text{SM}$$

$$\Rightarrow \text{Dök} = [0; 11]$$

$$\begin{aligned}
 \text{b) } G(x) &= E(x) - K(x) \\
 &= -50x^2 + 550x - (5x^3 - 60x^2 + 300x + 875) \\
 &= -50x^2 + 550x - 5x^3 + 60x^2 - 300x - 875
 \end{aligned}$$

$$GG = -5x^3 + 10x^2 + 250x - 875$$

$$G(x) = 0$$

$$0 = -5x^3 + 10x^2 + 250x - 875 \quad | :(-5)$$

$$0 = x^3 - 2x^2 - 50x + 175$$

$$\underline{x_1 = 5 \text{ ME}}$$

$$\begin{array}{r}
 (x^3 - 2x^2 - 50x + 175) : (x - 5) = x^2 + 3x - 35 \\
 -(x^3 - 5x^2) \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 3x^2 - 50x \\
 -(3x^2 - 15x) \\
 \hline
 -35x + 175 \\
 -(-35x + 175) \\
 \hline
 0
 \end{array}$$

$$x^2 + 3x - 35 = 0$$

$$x_{2/3} = -1.5 \pm \sqrt{2.25 + 35}$$

$$\underline{x_2 = 4.6 \text{ ME}}$$

$$\boxed{x_3 = -3.6}$$

$$\underline{\underline{GS = 4.6 \text{ ME}}}$$

$$\underline{\underline{GG = 5 \text{ ME}}}$$

$$\text{c) } G'(x) = 0 \text{ und } G''(x) \neq 0 \quad C(x_{Gmax} | P(x_{Gmax}))$$

$$G'(x) = -15x^2 + 20x + 250$$

$$G''(x) = -30x + 20$$

$$G''(4.8) = -124 < 0 \Rightarrow \text{Max}$$

$$0 = -15x^2 + 20x + 250 \quad | :(-15)$$

$$\underline{P(4.8) = 310 \text{ GE}}$$

$$0 = x^2 - \frac{4}{3}x - \frac{50}{3}$$

$$\underline{\underline{C(4.8 | 310)}}$$

$$x_{1/2} = +\frac{2}{3} \pm \sqrt{\frac{4}{9} + \frac{50}{3}}$$

$$\underline{x_1 = 4.8 \text{ ME}}$$

$$\boxed{x_2 = -3.5}$$

d)  $K'(x) = 15x^2 - 120x + 300$

$K''(x) = 30x - 120$

$K'''(x) = 30$

$K'(x) = 0$  und  $K''(x) \neq 0$

$0 = 30x - 120$

$30x = 120$

$x = 4 \text{ ME}$

$K'''(4) = 30 > 0 \Rightarrow \text{Min}$

$K'(4) = 60 \text{ GE}$

$GK_{\min}(4|60)$

Aufgabe 3

a)  $G(x) = -0,2x^3 + 0,6x^2 + 1,8x - 4$

$G(x) = 0$

$0 = -0,2x^3 + 0,6x^2 + 1,8x - 4 \quad | : (-0,2)$

$0 = x^3 - 3x^2 - 9x + 20$

$(x^3 - 3x^2 - 9x + 20) : (x - 4) = x^2 + 1x - 5$   $x_1 = 4 \text{ ME}$

$-(x^3 - 4x^2)$

$1x^2 - 9x$

$-(1x^2 - 4x)$

$-5x + 20$

$-(-5x + 20)$

$0$

$x^2 + 1x - 5 = 0$

$x_{2/3} = -0,5 \pm \sqrt{0,25 + 5}$

$x_2 = 1,8 \text{ ME}$

$[x_3 = -2,8]$

$GS = 1,8 \text{ ME}$

$GG = 4 \text{ ME}$

b)  $G'(x) = -0,6x^2 + 1,2x + 1,8$

$G''(x) = -1,2x + 1,2$

$G'(x) = 0$  und

$G''(x) \neq 0$

$$0 = -0,6x^2 + 1,2x + 1,8 \quad | :(-0,6)$$

$$0 = x^2 - 2x - 3$$

$$x_{1/2} = +1 \pm \sqrt{1+3}$$

$$G''(3) = -2,4 < 0 \Rightarrow \text{Max}$$

$$x_1 = 3 \text{ ME}$$

$$G(3) = 1,4 \text{ GE}$$

$$x_2 = -1$$

$$\underline{\underline{G_{\max}(3|1,4)}}$$

c)  $K(3) = 5,3 \text{ GE}$        $E(3) = ?$

$$G(3) = 1,4 \text{ GE}$$

$$G = E - K \quad | +K$$

$$\underline{G + K = E}$$

$$1,4 + 5,3 = E(3)$$

$$\underline{\underline{E(3) = 6,7 \text{ GE}}}$$

### Aufgabe 4

a)  $G'(x) = -1,5x^2 + x + 21$

$$G''(x) = -3x + 1$$

$$G''(4,1) = -11,3 < 0$$

$\Rightarrow \text{Max}$

$$\underline{P(4,1) = 19,6 \text{ GE}}$$

$$\underline{\underline{C(4,1|19,6)}}$$

$$G'(x) = 0 \quad \text{und} \quad G''(x) \neq 0$$

$$0 = -1,5x^2 + x + 21 \quad | :(-1,5)$$

$$0 = x^2 - \frac{2}{3}x - 14$$

$$x_{1/2} = +\frac{1}{3} \pm \sqrt{\frac{1}{9} + 14}$$

$$x_1 = 4,1 \text{ ME}$$

$$x_2 = -3,4$$

b)  $p(x) = -4x + 36$

$$E(x) = -4x^2 + 36x$$

$$E'(x) = -8x + 36$$

$$G'(x) = E'(x) - K'(x) \quad | +K'(x)$$

$$G'(x) + K'(x) = E'(x) \quad | -G'(x)$$

$$K'(x) = E'(x) - G'(x)$$

⑥ PV2

$$K'(x) = -8x + 36 - (-1,5x^2 + x + 21)$$

$$K'(x) = -8x + 36 + 1,5x^2 - x - 21$$

$$K'(x) = 1,5x^2 - 9x + 15$$

$$K''(x) = 3x - 9$$

$$K'''(x) = 3$$

$$K''(x) = 0 \text{ und } K'''(x) \neq 0$$

$$0 = 3x - 9$$

$$3x = 9$$

$$\underline{x = 3 \text{ ME}}$$

$$K'''(3) = 3 > 0 \\ \Rightarrow \text{Min}$$

$$\underline{K'(3) = 1,5 \text{ GE}}$$

$$\underline{\underline{GK_{\min} (3 | 1,5)}}$$