

5. Übungsaufgabe

- Lösungen -

1.1 Für die Schnittpunktkoordinaten gilt : $y = 0$

$$0 = -\frac{2}{3}x^2 + 4x - 2 \quad / \cdot (-\frac{3}{2})$$

$$0 = x^2 - 6x + 3$$

$$x_{1/2} = \frac{6 \pm \sqrt{36 - 4 \cdot 1 \cdot 3}}{2 \cdot 1}$$

$$\underline{x_1 = 5,45} \quad \vee \quad \underline{x_2 = 0,55}$$

$$\underline{\underline{S_1(5,45 | 0)}} \quad \underline{\underline{S_2(0,55 | 0)}}$$

1.2

$$y = -\frac{2}{3}(x^2 - 6x + 3)$$
$$y = -\frac{2}{3}(x^2 - 6x + 3^2 - 3^2 + 3)$$
$$y = -\frac{2}{3}[(x-3)^2 - 6]$$
$$\underline{\underline{y = -\frac{2}{3}(x-3)^2 + 4}} \quad \underline{\underline{S(3 | 4)}}$$

1.3

$$\underline{\underline{D(x) = \mathbb{R}}} ; \quad \underline{\underline{W(y) = \{y | y \leq 4\}}}$$

Gleichung der Symmetrieachse: $\underline{\underline{x = 3}}$

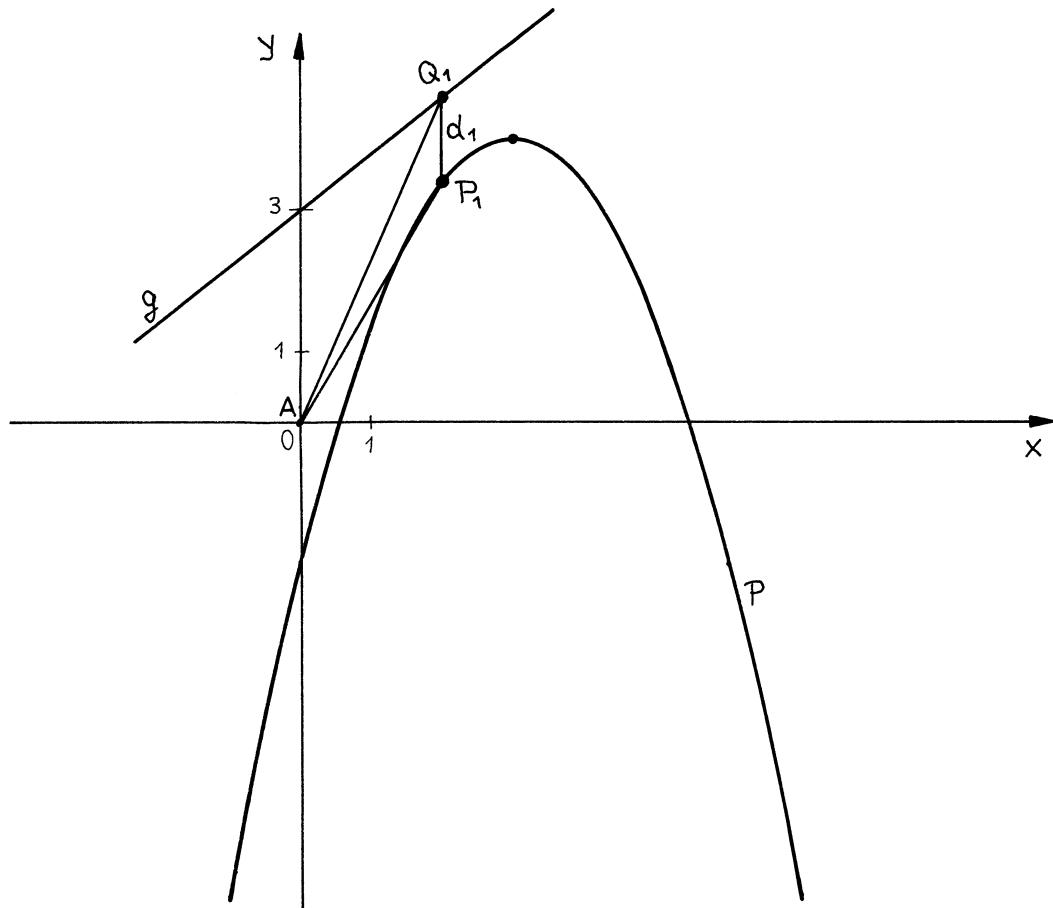
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1.4

x	-1	0	1	2	3	4	5	6	7
y	-6,67	-2	1,33	3,33	4	3,33	1,33	-2	-6,67

1.6

1.7



1.5

$$g: \begin{cases} y = 0,8x + 3 \\ P: \wedge y = -\frac{2}{3}x^2 + 4x - 2 \end{cases}$$

$$-\frac{2}{3}x^2 + 4x - 2 = 0,8x + 3$$

$$-\frac{2}{3}x^2 + 3,2x - 5 = 0 \quad / \cdot (-\frac{3}{2})$$

$$\underline{x^2 - 4,8x + 7,5 = 0}$$

$$D = (-4,8)^2 - 4 \cdot 1 \cdot 7,5$$

$$\underline{D = -6,96}$$

aus $D < 0$ folgt : $\mathbb{L} = \emptyset$

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1.8

$$d(x) = y_Q - y_P$$

$$d(x) = 0,8x + 3 - \left(-\frac{2}{3}x^2 + 4x - 2\right)$$

$$d(x) = 0,8x + 3 + \frac{2}{3}x^2 - 4x + 2$$

$$\underline{\underline{d(x) = \frac{2}{3}x^2 - 3,2x + 5}}$$

1.9

$$d(x) = \frac{2}{3}(x^2 - 4,8x + 7,5)$$

$$d(x) = \frac{2}{3}(x^2 - 4,8x + 2,4^2 - 2,4^2 + 7,5)$$

$$d(x) = \frac{2}{3}[(x - 2,4)^2 + 1,74]$$

$$\underline{\underline{d(x) = \frac{2}{3}(x - 2,4)^2 + 1,16}}$$

$$\underline{\underline{d_{\min} = 1,16}} \quad (\text{für } x = 2,4)$$

Bestimmung von:

$$P_0: \quad y_0 = -\frac{2}{3} \cdot (2,4)^2 + 4 \cdot 2,4 - 2$$

$$\quad \quad \quad \underline{\underline{y_0 = 3,76}}$$

$$\underline{\underline{P_0(2,4 | 3,76)}}$$

$$Q_0: \quad y_0 = 0,8 \cdot 2,4 + 3$$

$$\quad \quad \quad \underline{\underline{y_0 = 4,92}}$$

$$\underline{\underline{Q_0(2,4 | 4,92)}}$$

1.10

1. Methode:

$$A = \frac{1}{2} \cdot g \cdot h$$

$$A = \frac{1}{2} \cdot \overline{PQ} \cdot x$$

$$A = \frac{1}{2} \cdot \left(\frac{2}{3}x^2 - 3,2x + 5\right) \cdot x$$

$$\underline{\underline{A = \frac{1}{3}x^3 - 1,6x^2 + 2,5x \text{ FE}}}$$

2. Methode:

$$A = \frac{1}{2} \left| \overrightarrow{AP} \quad \overrightarrow{AQ} \right|$$

$$A = \frac{1}{2} \left| \begin{pmatrix} -\frac{2}{3}x^2 + 4x - 2 \\ 0,8x + 3 \end{pmatrix} \right|$$

$$A = \frac{1}{2} (0,8x^2 + 3x + \frac{2}{3}x^3 - 4x^2 + 2x)$$

$$\underline{\underline{A = \frac{1}{3}x^3 - 1,6x^2 + 2,5x \text{ FE}}}$$

1.11

$$A_{\Delta AP_0 Q_0} = \frac{1}{2} \cdot 1,16 \cdot 2,4$$

$$\underline{\underline{A_{\Delta AP_0 Q_0} = 1,39 \text{ FE}}}$$

$$A = \frac{1}{3} \cdot 2,4^3 - 1,6 \cdot 2,4^2 + 2,5 \cdot 2,4$$

$$\underline{\underline{A_{\Delta AP_0 Q_0} = 1,39 \text{ FE}}}$$

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1.12

$$f: y = -\frac{2}{3}x^2 + 4x - 2$$

$$R^{-1}: x = -\frac{2}{3}y^2 + 4y - 2$$

$$-\frac{2}{3}y^2 + 4y - 2 - x = 0 \quad | \cdot (-\frac{3}{2})$$

$$y^2 - 6y + 3 - 1,5x = 0$$

$$y^2 - 6y + 3^2 - 3^2 + 3 - 1,5x = 0 \quad \text{quadrat. Ergänz.}$$

$$(y - 3)^2 - 6 - 1,5x = 0$$

$$(y - 3)^2 = 1,5x + 6 \quad | \sqrt{\quad}$$

$$|y - 3| = \sqrt{1,5x + 6}$$

$$R^{-1}: \underline{\underline{y = 3 \pm \sqrt{1,5x + 6}}}$$

1.13

$$G_1: \mathbb{D}(f_1) = \{x \mid x \geq 3\}$$

$$G_2: \mathbb{D}(f_2) = \{x \mid x \leq 3\}$$

$$\mathbb{D}(f^{-1}) = \{x \mid x \leq 4\}$$

$$W(f^{-1}) = \{y \mid y \geq 3\}$$

$$\mathbb{D}(f^{-2}) = \{x \mid x \leq 4\}$$

$$W(f^{-2}) = \{y \mid y \leq 3\}$$