A)

Lösungen:

BM-Math. Prüfung: Lineare- und Quadratische Funktionen

1) a) Fkt. c) – e) –
(je ½ P) b) – d) Fkt. f) – **(3P)**

2) a) $b = 3$

$m = \frac{\Delta y}{\Delta x} = \frac{1}{2}$ $\quad y = 0{,}5x + 3$ ½P

b) $b = -3$

$m = \frac{\Delta y}{\Delta x} = \frac{-1}{3}$ $\quad y = -\frac{1}{3}x - 3$ ½

c) $m = \frac{\Delta y}{\Delta x} = \frac{4}{-2} = -2$

$y = mx + b$ Pkt. (10/0) einsetzen

$0 = -2 \cdot 10 + b$

$b = 20$ $\quad y = -2x + 20$ ½

d) $m = \frac{-6}{2} = -3$

$0 = -3 \cdot 4 + b$ (4/0) eingesetzt!

$b = 12$ ½!

$y = -3x + 12$

je ½ P **(2P)**

3) a) $m_1 = 0{,}5$

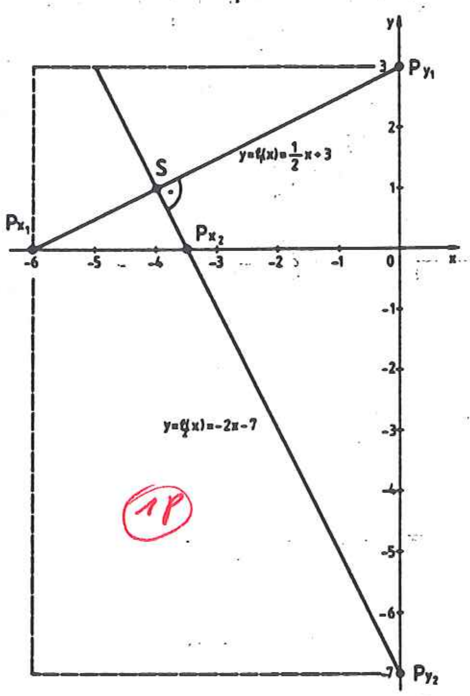
$m_2 = -\frac{1}{0{,}5} = -2$

$f_2: \; y_2 = m_2 x + b_2$

P_2 einsetzen: $-3 = -2(-2) + b_2$

$b_2 = -7$

$f_2: \; y = -2x - 7$ (1P)



b) S → Schnittpunkt

$f_1 \cap f_2$

$0{,}5x + 3 = -2x - 7$

$x_S = -4$

$y_S = 1$ $\quad S(-4/1)$ (1P) **(3P)**

4) a) $y = x^2 - 8x - 5$

$y = \underbrace{x^2 - 8x + 4^2} - 4^2 - 5$

$y = (x-4)^2 - 21$ $\quad$ $\underline{S(4/-21)}$ 1P

b) $y = -x^2 - 14x - 1$

$y = -[x^2 + 14x + 1]$

$y = -[x^2 + 14x + 7^2 - 7^2 + 1]$

$y = -[(x+7)^2 - 49 + 1]$

$y = -(x+7)^2 + 48$ $\quad$ $\underline{S(-7/48)}$ 1P

2P

---

5) a) $y = x^2 - x + 1$

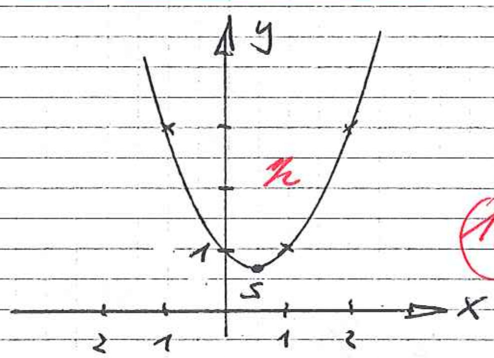
$y = x^2 - x + \left(\frac{1}{2}\right)^2 - \left(\frac{1}{2}\right)^2 + 1$

$y = \left(x - \frac{1}{2}\right)^2 + 0{,}75$ $\quad$ $\underline{S(0{,}5/0{,}75)}$

Nullstelle mit TR $\rightarrow$ keine Nullstelle

y - Abschnitt

$\underline{y = 1}$ $\quad$ 1



1½P

b) $y = (6-x)^2$

$y = (-x+6)^2$ $\quad$ $\underline{S(6/0)}$

Nullstellen

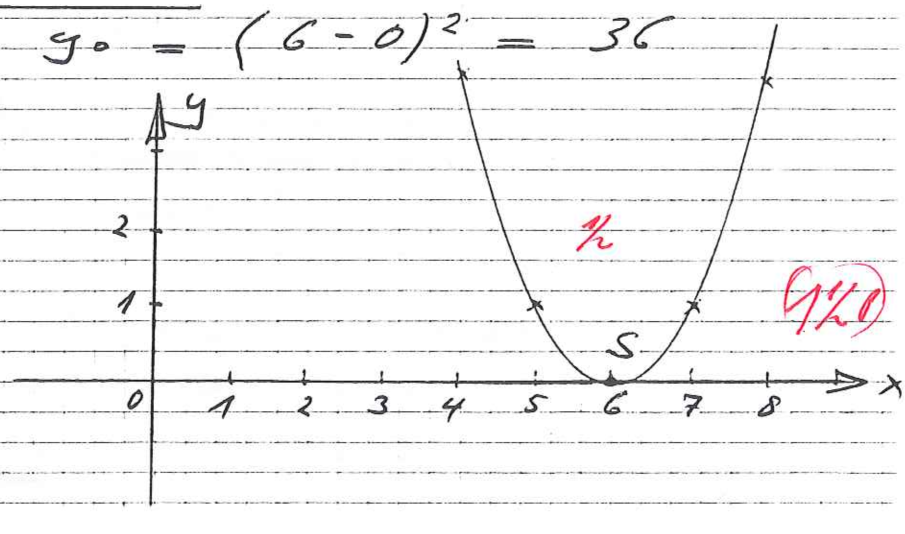
$y = x^2 - 12x + 36$ $\quad$ mit TR $\rightarrow$ $x_1 = 6$

$x_2 = 6$

1P

y - Achsenabschnitt

$x = 0 \Rightarrow y_0 = (6-0)^2 = 36$



1½P

6) P_1 : $f_1 \cap f_2$ Lösung:

a) $x + 3{,}5 = 4x + 5$

$x = -0{,}5$

$y = 3$ $\qquad P_1(-0{,}5/3)$

gesucht P_2 : $f_1 \cap f_3$

$x + 3{,}5 = -x - 7{,}5$

$x = -5{,}5$

$y = -2$ $\qquad P_2(-5{,}5/-2)$

gesucht P_3 : $f_2 \cap f_3$

$4x + 5 = -x - 7{,}5$

$x = -2{,}5$

$y = -5$ $\qquad P_3(-2{,}5/-5)$ 1P

b) $y = ax^2 + bx + c$

$$\begin{array}{l|l|} I & 3 = 0{,}25a - 0{,}5b + c \\ II & -2 = 30{,}25a - 5{,}5b + c \\ III & -5 = 6{,}25a - 2{,}5b + c \end{array}$$

mit TR $\Rightarrow$ $a = 1$ $\quad c = 6{,}25$

$b = 7$

$y = x^2 + 7x + 6{,}25$ 1P

c) $y = x^2 + 7x + 6{,}25$

$y = \underbrace{x^2 + 7x + 3{,}5^2} - 3{,}5^2 + 6{,}25$

$y = (x + 3{,}5)^2 - 6$

$S(-3{,}5/-6)$

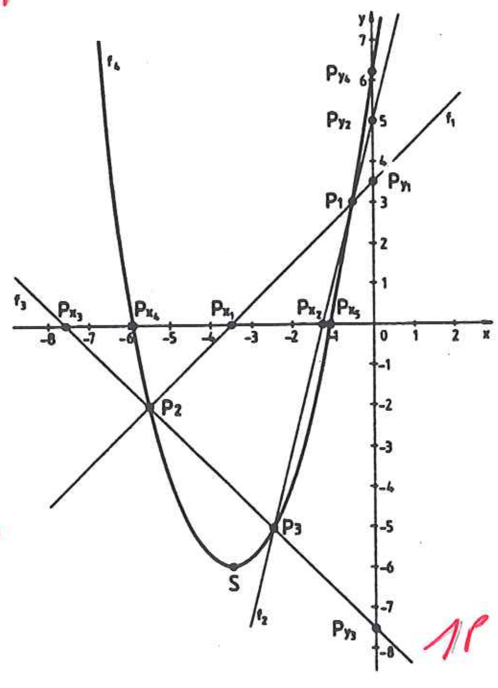
y-Achsenschnittpkt $Y_0(0/6{,}25)$

x-Achsenschnittpkt.

1P

$X_1(-1{,}0505/0)$

$X_2(-5{,}9494/0)$



1P

Lösungen

BM-Math. Prüfung: Lineare- und Quadratische Funktionen B

1) a) $y = -x$

c) $y = \frac{1}{8}x + 4$

d) $y = 5$

b)
$y = a(x - x_s)^2 + y_s$
$y = a(x - 5{,}5)^2 + 2{,}5$
$-3 = a(3 - 5{,}5)^2 + 2{,}5$
$-3 = a \cdot 6{,}25 + 2{,}5$
$a = -0{,}88$
$y = -0{,}88(x - 5{,}5)^2 + 2{,}5$
$y = -0{,}88x^2 + 9{,}68x - 24{,}12$

---

2) a)
$y = -3x^2 + 12x - 9$
$y = -3[x^2 - 4x + 3]$
$y = -3[(x-2)^2 - 1]$
$y = -3(x-2)^2 + 3$

$S(2/3)$

b)
$y = x^2 - 4x + 9$
$y = x^2 - 4x + 2^2 - 2^2 + 9$
$y = (x-2)^2 - 4 + 9$
$y = (x-2)^2 + 5$

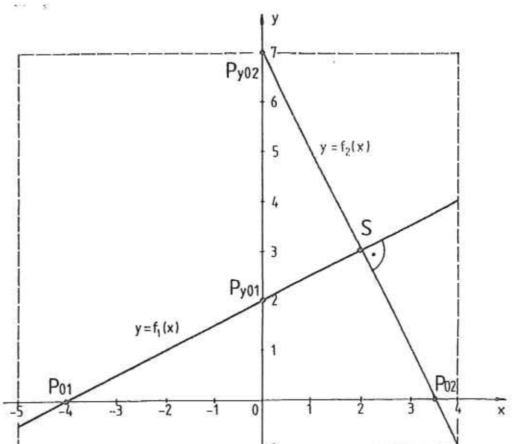
$S(2/5)$

c)
$y = -x^2 + 14x - 1$
$y = -[x^2 - 14x + 1]$
$y = -[x^2 - 14x + 7^2 - 7^2 + 1]$
$y = -[(x-7)^2 - 48] = -(x-7)^2 + 48$

$S(7/48)$

---

3) g_1:
$y = 0{,}5x + b$
$3 = 0{,}5 \cdot 2 + b$
$b = 2$
$y = 0{,}5x + 2$



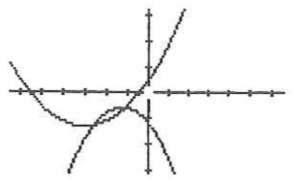
Steigung v. g_2: $m_2 = -\frac{1}{m_1}$
$m_2 = -2$

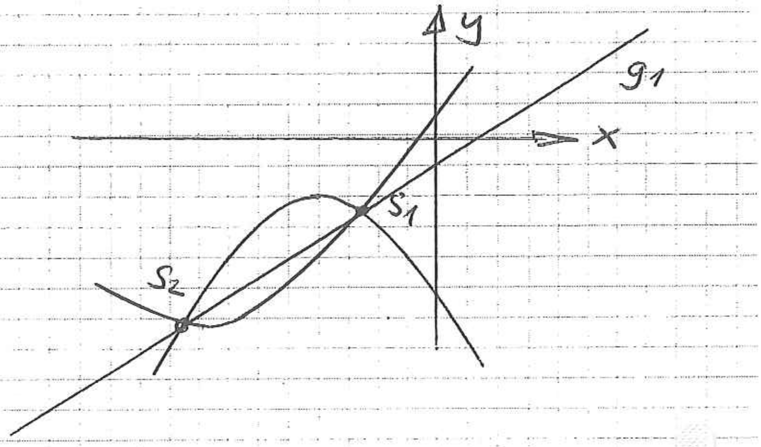
g_2:
$y = -2x + b$
$3 = -2 \cdot 2 + b$
$b = 7 \Rightarrow y = -2x + 7$

4) Mit TR → PLOT

Schnittpunkte: $S_1\,(-1{,}106\,85 \,/\, -2{,}915\,98)$

TR / PLOT $S_2\,(-2{,}559\,81 \,/\, -6{,}306\,238)$





$$m = \frac{\Delta y}{\Delta x} = \frac{-3{,}39025}{-1{,}4529}$$

$$m = 2{,}333$$

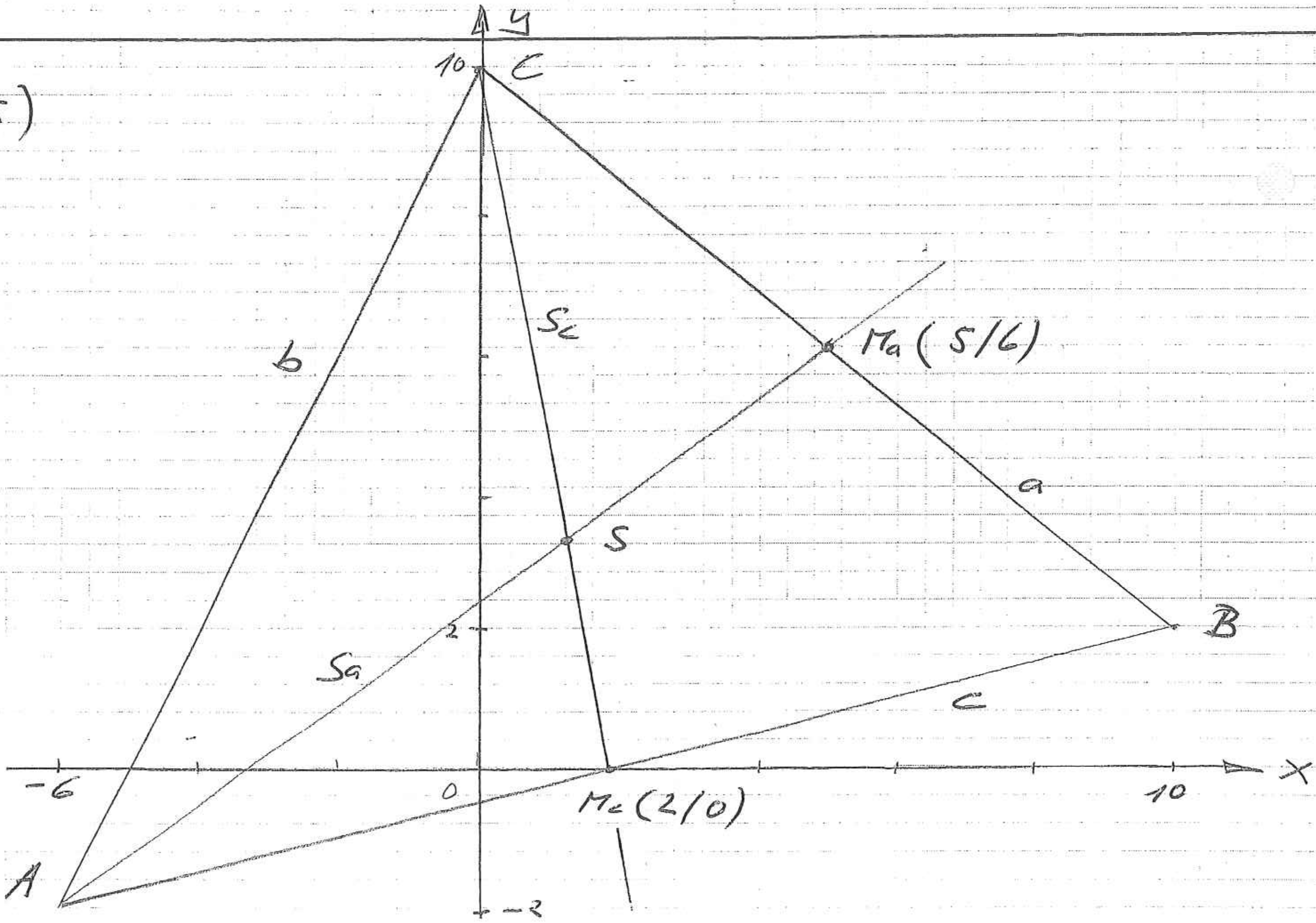
$$y = 2{,}333x + b \quad \text{(Punkt S1 einsetzen)}$$

$$-2{,}915 = 2{,}333 \cdot (-1{,}10685) + b$$

$$b = -\tfrac{1}{3}$$

$$\underline{y = 2{,}333x - 0{,}3\overline{3}}$$

5)



$S_c: \quad y = mx + b \qquad m = \frac{\Delta x}{\Delta y} = \frac{-10}{2} = -5$

$y = -5x + b$

$y = -5x + 10$

$S_a: \quad y = mx + b \qquad m = \frac{8}{11}$

$y = \frac{8}{11}x + b$

$6 = \frac{8}{11} \cdot 5 + b \qquad P(5/6)$ eingesetzt

$b = 2{,}3636$

$y = 8/11\, x + 2{,}3636$

$S \Longrightarrow S_a \cap S_c$

$-5x + 10 = 8/11\, x + 2{,}3636$

$x = 1{,}33\overline{3}$

$y = -5 \cdot 1{,}3\overline{3} + 10 = 3{,}\overline{3}$

$S(4/3 \,/\, 10/3)$

---

6)

a)

P_1:

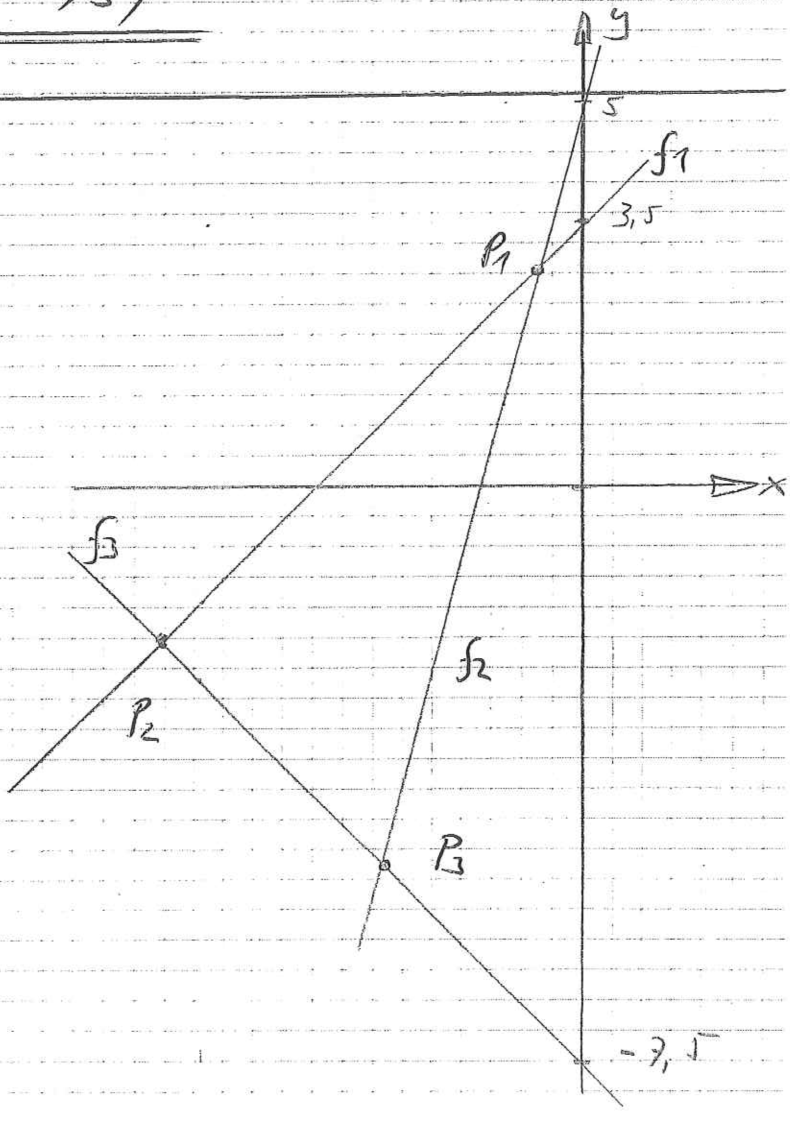
$f_1 \cap f_2$

$x + 3{,}5 = 4x + 5$

$x = -0{,}5$

$y = 3$

$P_1(-0{,}5/3)$



P_2:

$f_1 \cap f_3$

$x + 3{,}5 = -x - 7{,}5$

$x = -5{,}5$

$y = -2$

$P_2(-5{,}5/-2)$

P_3: $f_2 \cap f_3$

$$4x + 5 = -x - 7{,}5$$
$$x = -2{,}5$$
$$y = -5$$

$P_3(-2{,}5 / -5)$

b) $ax^2 + bx + c = y$

I	0,25	−0,5	1	=	3
II	30,25	−5,5	1	=	−2
III	6,25	−2,5	1	=	−5

mit TR: $a = 1$
$b = 7$
$c = 6{,}25$

$\Rightarrow$ $y = x^2 + 7x + 6{,}25$

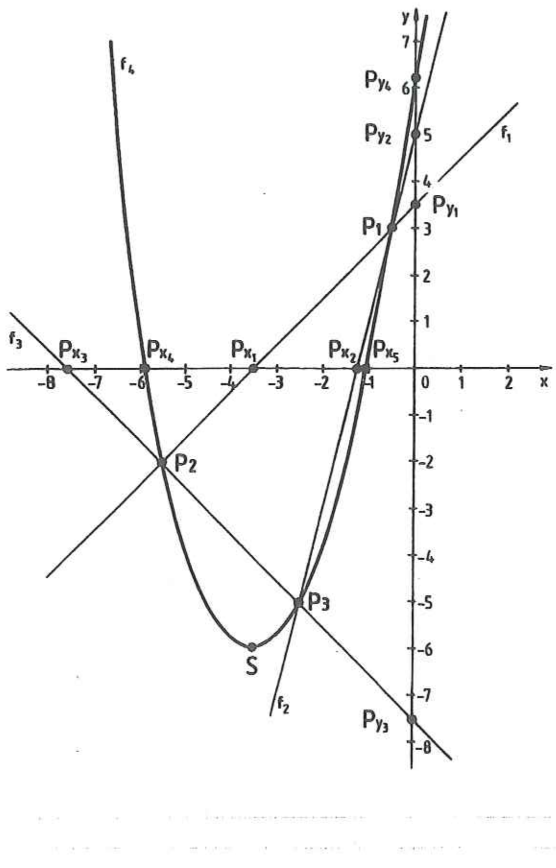
c) mit TR: Nullstellen und Scheitelpunkt

$x_1 = -1{,}0505$

$x_2 = -5{,}949$

$S(-3{,}5 / -6)$

d) Graphen der Funktionen $\longrightarrow$



GS BM B) Lösungen

BM-Math. Prüfung: Lineare- und Quadratische Funktionen

1) a) $\underline{\underline{y = -x}}$

b) $y = a(x - x_s)^2 + y_s$

$y = a(x - 5{,}5)^2 + 2{,}5$

$-3 = a(3 - 5{,}5)^2 + 2{,}5$

$-3 = a \cdot 6{,}25 + 2{,}5$

$a = -0{,}88$

$y = -0{,}88(x - 5{,}5)^2 + 2{,}5$

$\underline{\underline{y = -0{,}88x^2 + 9{,}68x - 24{,}1}}$

c) $\underline{\underline{y = \frac{1}{8}x + 4}}$

d) $\underline{\underline{y = 5}}$

---

2) a) $y = -3x^2 + 12x - 9$

$y = -3[x^2 - 4x + 3]$

$y = -3[(x-2)^2 - 1]$

$\underline{\underline{y = -3(x-2)^2 + 3}}$

$\underline{\underline{S(2/3)}}$

b) $y = x^2 - 4x + 9$

$y = x^2 - 4x + 2^2 - 2^2 + ...$

$y = (x-2)^2 - 4 + 9$

$\underline{\underline{y = (x-2)^2 + 5}}$

$\underline{\underline{S(2/5)}}$

c) $y = -x^2 + 14x - 1$

$y = -[x^2 - 14x + 1]$

$y = -[x^2 - 14x + 7^2 - 7^2 + 1]$

$y = -[(x-7)^2 - 48] = \underline{\underline{-(x-7)^2 + 48}}$

$\underline{\underline{S(7/48)}}$

---

3) g_1: $y = 0{,}5x + b$

$3 = 0{,}5 \cdot 2 + b$

$b = 2$

$\underline{\underline{y = 0{,}5x + 2}}$

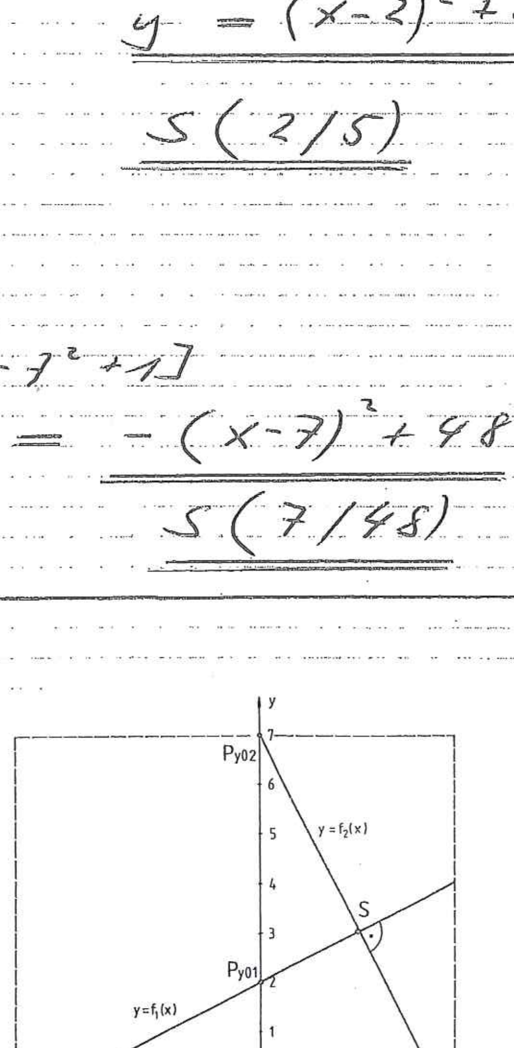
Steigung v. g_2: $m_2 = -\frac{1}{m_1}$

$m_2 = -2$

g_2: $y = -2x + b$

$3 = -2 \cdot 2 + b$

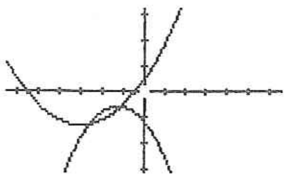
$b = 7 \Rightarrow \underline{\underline{y = -2x + 7}}$

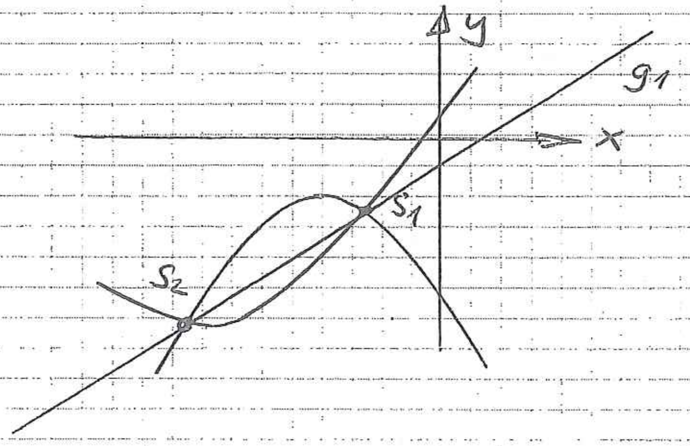


4) Mit TR → PLOT

Schnittpunkte: $S_1\ (-1{,}10685 \mid -2{,}91598)$

TR/PLOT $S_2\ (-2{,}55981 \mid -6{,}306238)$





$m = \frac{\Delta y}{\Delta x} = \frac{-3{,}39025}{-1{,}4529}$

$m = 2{,}333$

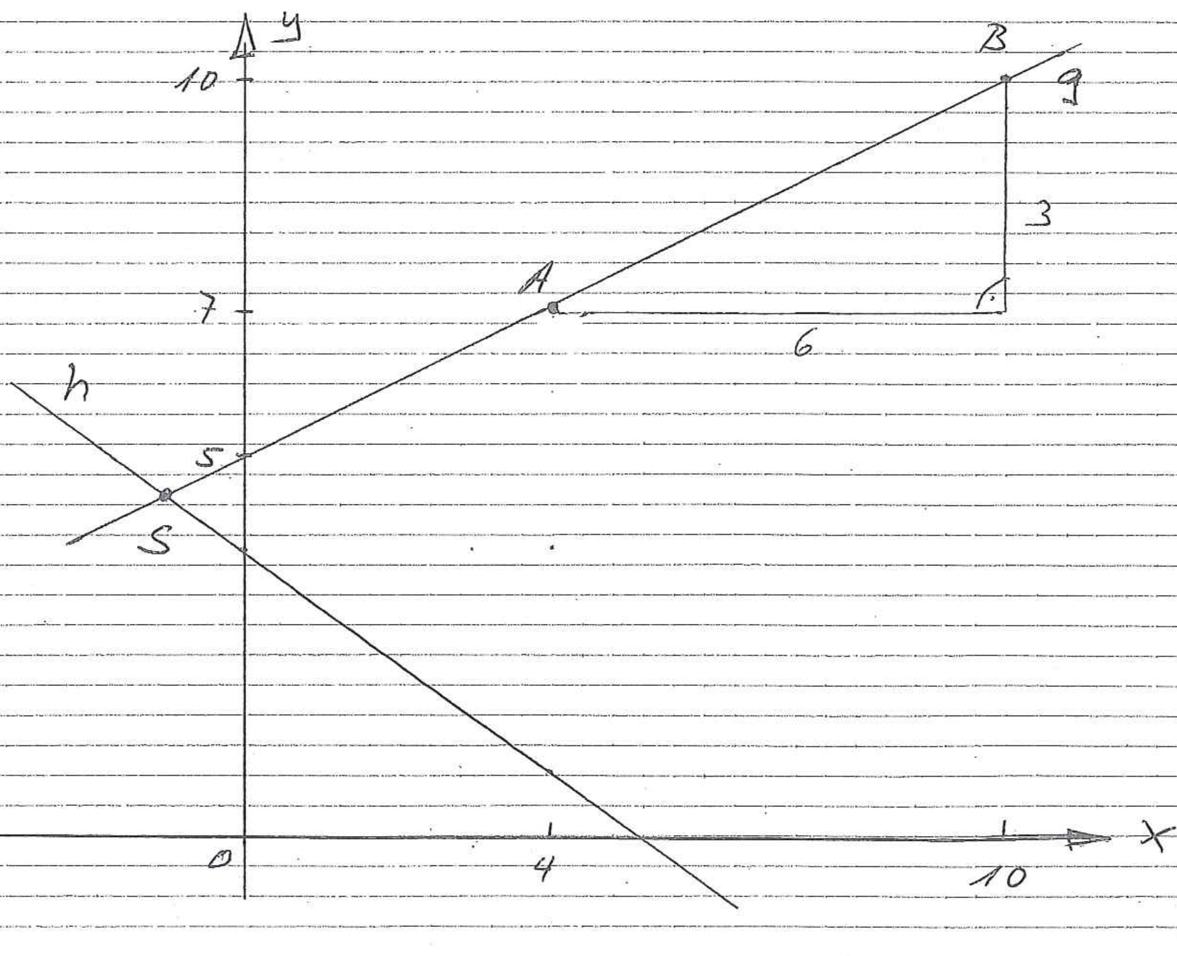
$y = 2{,}333x + b$ (Punkt S1 einsetzen)

$-2{,}915 = 2{,}333 \cdot (-1{,}10685) + b$

$b = -\frac{1}{3}$

$y = 2{,}333x - 0{,}3\overline{3}$

5)



a) $m = \frac{\Delta y}{\Delta x} = \frac{3}{6} = 1/2$

$y = 1/2\, x + b$

$10 = \frac{1}{2} \cdot 10 + b$ (Punkt B eingesetzt)

$b = 5 \Rightarrow y = \frac{1}{2} x + 5$

b) $3x + 4y - 15 = 0$

$y = -3/4\, x + \frac{15}{4}$

$g \cap h$

$\frac{1}{2} x + 5 = -3/4\, x + 15/4$

$x = -1$

$y = 4{,}5$ $S(-1 / 4{,}5)$

---

6) $y = a(x + x_S)^2 + y_S$ (Scheitelform)

$y = a(x - 4{,}5)^2 + 3$

$P(0/0) \Rightarrow 0 = a(0 - 4{,}5)^2 + 3$

$0 = 20{,}25a + 3$

$a = -0{,}1481 = -4/27$

$y = -0{,}1481(x - 4{,}5)^2 + 3$

$y = -0{,}1481x^2 + 4/3\, x$

$y = -4/27\, x^2 + 4/3\, x$

BM-Math. Prüfung: **Lineare- und Quadratische Funktionen** c)

1. Aufgabe: Welches Diagramm stellt den Graphen einer Funktion dar ?

(je 1/2 P) a) Fkt. b) – c) –
d) Fkt. e) – f) – (3P)

2) a) $y = x^2 + 3x + 2{,}25$
$y = x^2 + 3x + 1{,}5^2 \underbrace{- 1{,}5^2 + 2{,}25}_{0}$
$y = (x + 1{,}5)^2$ 1/2 — $S(-1{,}5/0)$ 1/2

(je 1/2 P) b) $y = -3x^2 - 6x + 10$
$y = -3[x^2 + 2x - 3\frac{1}{3}]$
$y = -3[x^2 + 2x + 1 \underbrace{- 1 - 3\frac{1}{3}}]$
$y = -3[(x+1)^2 - 13/3]$
$y = -3(x+1)^2 + 13$ — $S(-1/13)$ (3P)

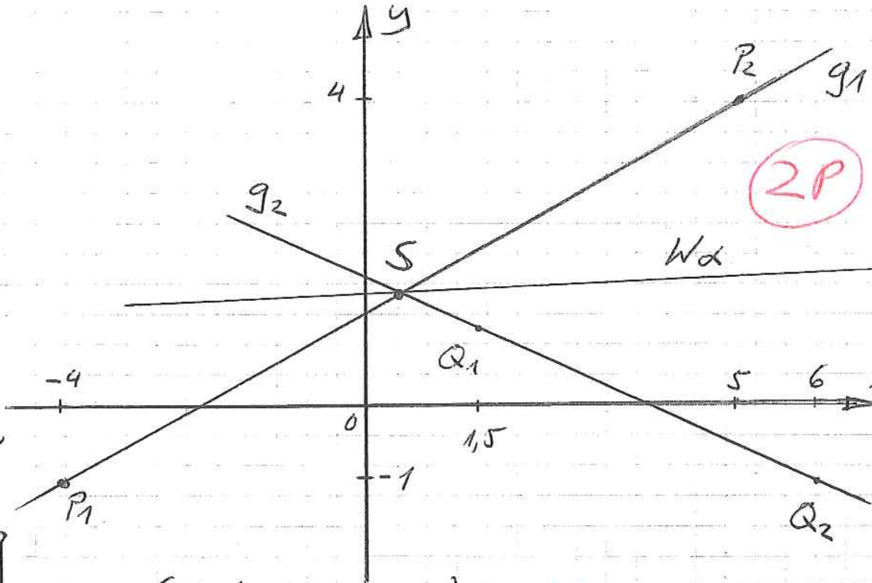
c) $y = (4 + 2x)^2 = 4(x+2)^2$
$y = 4(x+2)^2$ — $S(-2/0)$

3) 0,55..

$g_1: \quad y = \frac{5}{9}x + \frac{11}{9}$

$g_2: \quad y = -\frac{4}{9}x + \frac{5}{3}$

−0,444



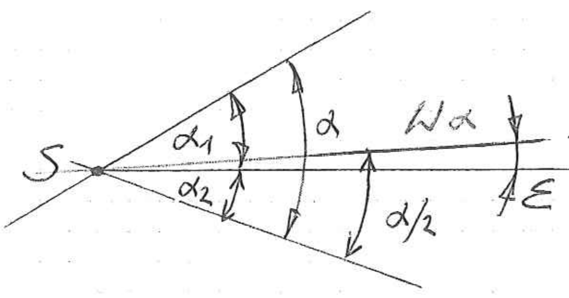
$S \Rightarrow g_1 \cap g_2$

$\frac{5}{9}x + \frac{11}{9} = -\frac{4}{9}x + \frac{5}{3}$

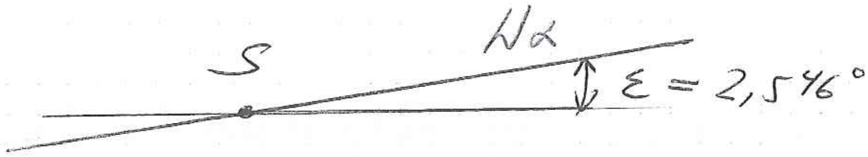
$x = \frac{4}{9}$

$y = 1{,}469$ } $S(4/9 / 1{,}469)$ 1P

$S(0{,}\overline{4} / 1{,}469)$



$\sphericalangle \alpha_1 = Tan^{-1}(5/9) = 29{,}0546°$
$\sphericalangle \alpha_2 = Tan^{-1}(4/9) = 23{,}9625°$
$\sphericalangle \alpha = 53{,}0171°$
$\alpha/2 = 26{,}5086°$
$\varepsilon = 2{,}546°$



Steigung: $m = \tan 2{,}546° = 0{,}04446$

Wα: $y = 0{,}0446x + b$ (S einsetzen)

$1{,}469 = 0{,}0446 \cdot \frac{4}{9} + b$

$b = 1{,}449$ $\qquad$ $y = 0{,}04446x + 1{,}45$

1P

4) a) $m_1 = 0{,}5$

$m_2 = -\frac{1}{0{,}5} = -2$

f_2: $y_2 = m_2 x + b_2$

P_2 einsetzen: $-3 = -2(-2) + b_2$

$b_2 = -7$

f_2: $y = -2x - 7$ 1P

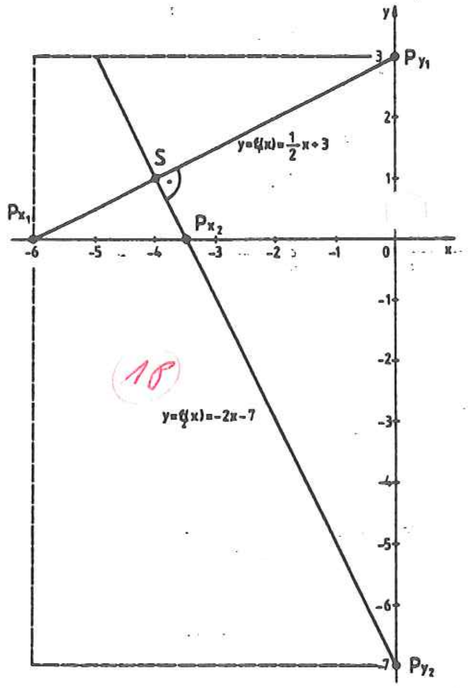
b) S → Schnittpunkt

$f_1 \cap f_2$

$0{,}5x + 3 = -2x - 7$

$x_s = -4$

$y_s = 1$ $\qquad$ $S(-4|1)$ 1P



3P

5) P_2 ($x = 2$ einsetzen)

$y = 5/3 \cdot 2 + 5/9$

$y = 35/9$

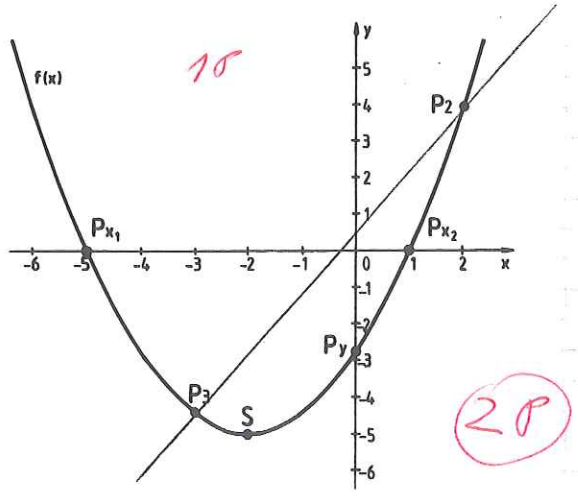
$P_2(2/\,35/9)$ $3{,}\overline{8}$ $\qquad$ $P_3(-3/-40/9)$ $(-3/-4{,}\overline{4})$

$P_1(0/-25/9)$ $2{,}\overline{7}$

Eine Parabel ist durch 3 Punkte bestimmt: ...

$y = 5/9\,x^2 + 20/9\,x - 25/9$ 1P

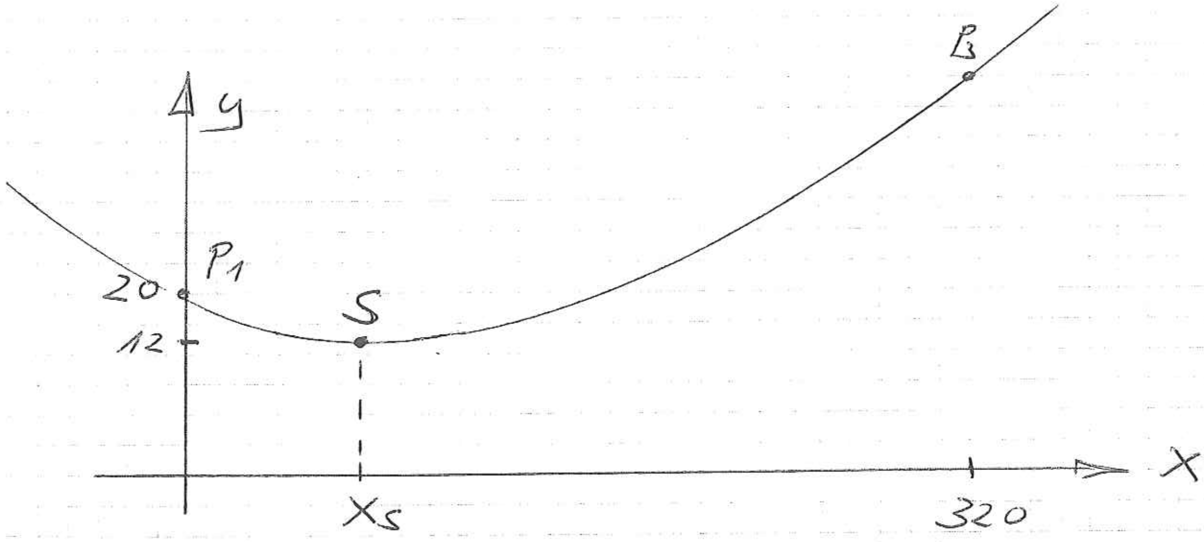
$y = 0{,}\overline{5}\,x^2 + 2{,}\overline{2}\,x - 2{,}\overline{7}$



$S(-2/-5)$

2P

6)



<u>Schaitelpunktform:</u>

$$y = a(x - x_S)^2 + b \qquad (b = 12)$$

$$y = a(x - x_S)^2 + 12$$

$$\begin{array}{l|l|l} I & 50 = a(320 - x_S)^2 + 12 & P_3\ (320/50) \\ II & 20 = a(0 - x_S)^2 + 12 & P_1\ (0/20) \end{array}$$

Mit TR Gleichungssystem lösen:

$$a = 0{,}00079$$

$$x_S = 100{,}65\ m$$

(2P)

Total 15P

TR

Lösungen:

BM-Math. Prüfung: Lineare- und Quadratische Funktionen D)

mit Folien

1. Aufgabe: Der Graph ist eine Gerade. Wie lautet die Funktionsgleichung?

a) $y = -\frac{5}{4}x + 2{,}25$ b) $x = -2$ (keine Fkt.) 2P

c) $y = \frac{2}{3}x - \frac{2}{3}$ d) $y = -\frac{1}{5}x + \frac{-9}{5}$

2. Aufgabe

a) $y = -8\,[x^2 - 3x - 1{,}5]$ 2P

$y = -8\,[x^2 - 3x + 1{,}5^2 - 1{,}5^2 - 1{,}5]$

$y = -8\,[(x - 1{,}5)^2 - 3{,}75]$

$y = -8\,(x - 1{,}5)^2 + 30$ $S(1{,}5/30)$

1R → 1P

2R → 1½ P

3R → 2 P

b) $y = x^2 - x + 0$

$y = x^2 - x + 0{,}5^2 - 0{,}5^2$

$y = (x - 0{,}5)^2 - 0{,}25$ $S(0{,}5/-0{,}25)$

c) $y = 2\,[x^2 + 7x - 5x - 35]$

$y = 2\,[x^2 + 2x - 35]$

$y = 2\,[x^2 + 2x + 1 - 1 - 35]$

$y = 2\,[(x+1)^2 - 36]$

$y = 2\,(x+1)^2 - 72$ $S(-1/-72)$

3. Aufg. 2P

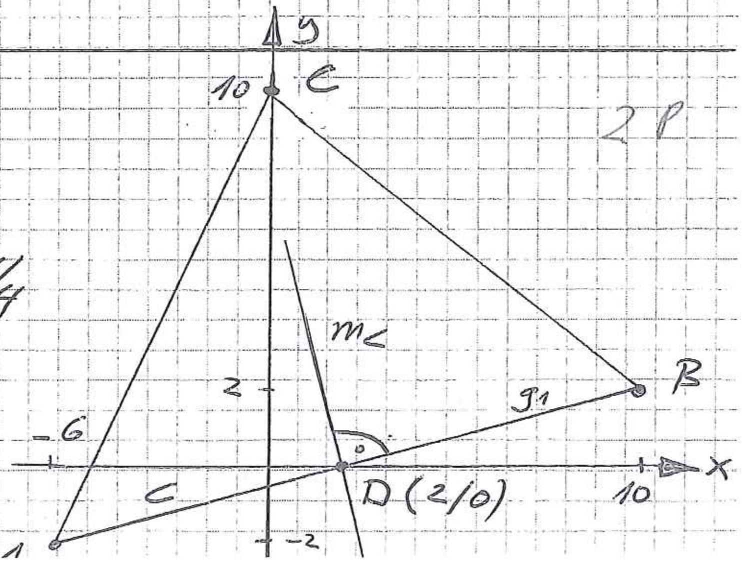
Steigung von Seite c:

$m_1 = \frac{\Delta y}{\Delta x} = \frac{4}{16} = \frac{1}{4}$

Steigung von Lot:

$m_2 = -\frac{1}{m_1} = -4$

$D(2/0)$ einsetzen: $y = -4x + 6$

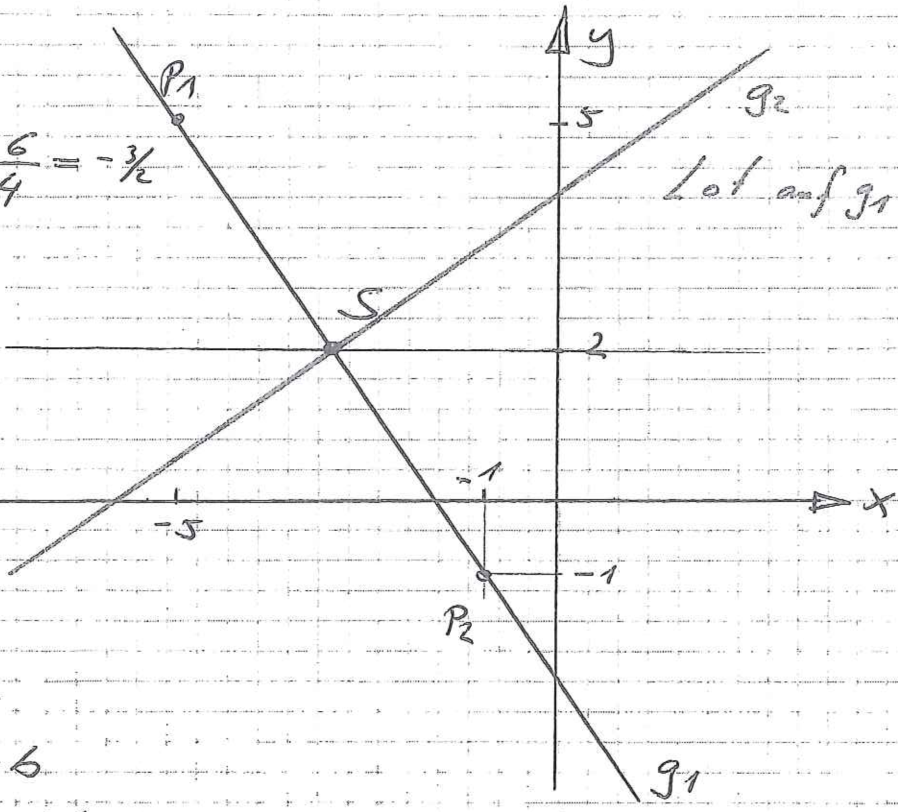


$$y = -4x + b$$

$D(2/0) \Rightarrow 0 = -4 \cdot 2 + b \Rightarrow b = 8$

Funkt. Gl. von m_C : $\underline{\underline{y = -4x + 8}}$

<u>4. Aufg.</u>



m_1 : $m_1 = \frac{\Delta y}{\Delta x} = -\frac{6}{4} = -3/2$

$m_1 = -1,5$

m_2 : $m_2 = -\frac{1}{m_1}$

$\underline{\underline{m_2 = +\frac{2}{3}}}$

a) <u>Fkt. der Gerade g1</u>

$y = ax + b$

$y = -1,5x + b$

$P_2 \Rightarrow -1 = -1,5(-1) + b \Rightarrow b = -2,5$ 3P

f_1: $\underline{\underline{y = -1,5x - 2,5}}$

b) <u>Fkt. Gl. der Gerades g2</u>

$y = ax + b$

$y = \frac{2}{3}x + b$

$S \Rightarrow 2 = \frac{2}{3} \cdot (-3) + b$

$b = 4$

f_2: $\underline{\underline{y = \frac{2}{3}x + 4}}$

<u>Schnittpunkt S</u>

$y = -1,5x - 2,5$

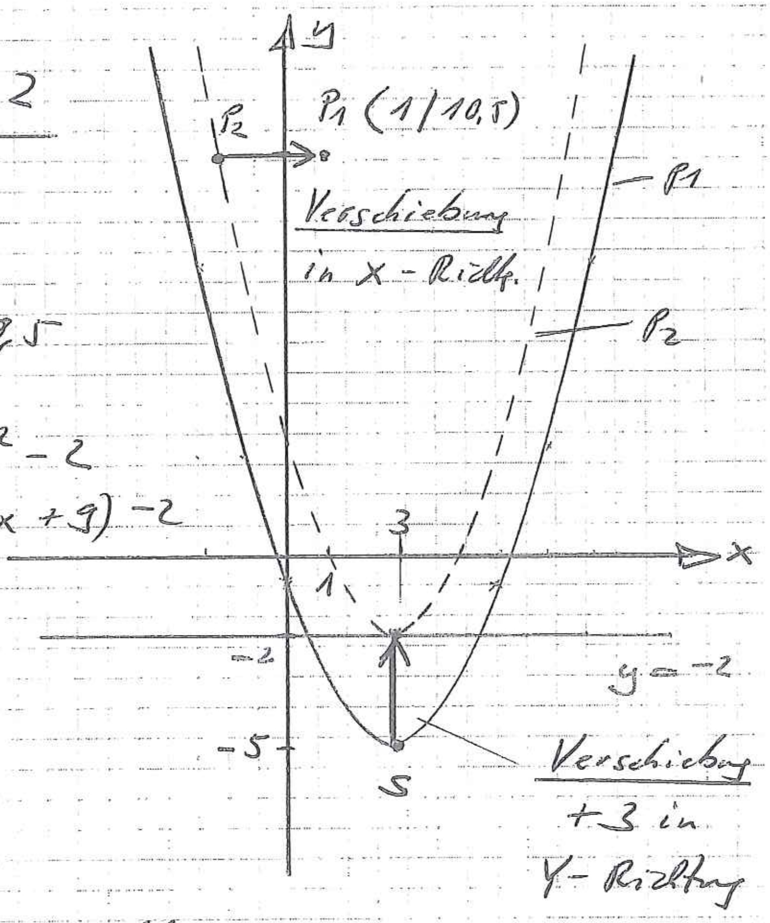
$2 = -1,5x - 2,5$

$x = -3$

$\underline{\underline{S(-3/2)}}$

5) $y = 0{,}5x^2 - 3x - 0{,}5$

$y = 0{,}5(x-3)^2 - 5$ Scheitelform : $S(3|-5)$



P_2 : $y = 0{,}5(x-3)^2 - 2$

Koordinaten v. P_2:

y von $P_2 = 10{,}5$

$\Rightarrow$ $10{,}5 = 0{,}5(x-3)^2 - 2$

$10{,}5 = 0{,}5(x^2 - 6x + 9) - 2$

etc

$x_1 = 8$

$x_2 = -2$

$\Rightarrow$ Verschiebung:

3 Einheiten nach rechts

oder 7 Einheiten nach links

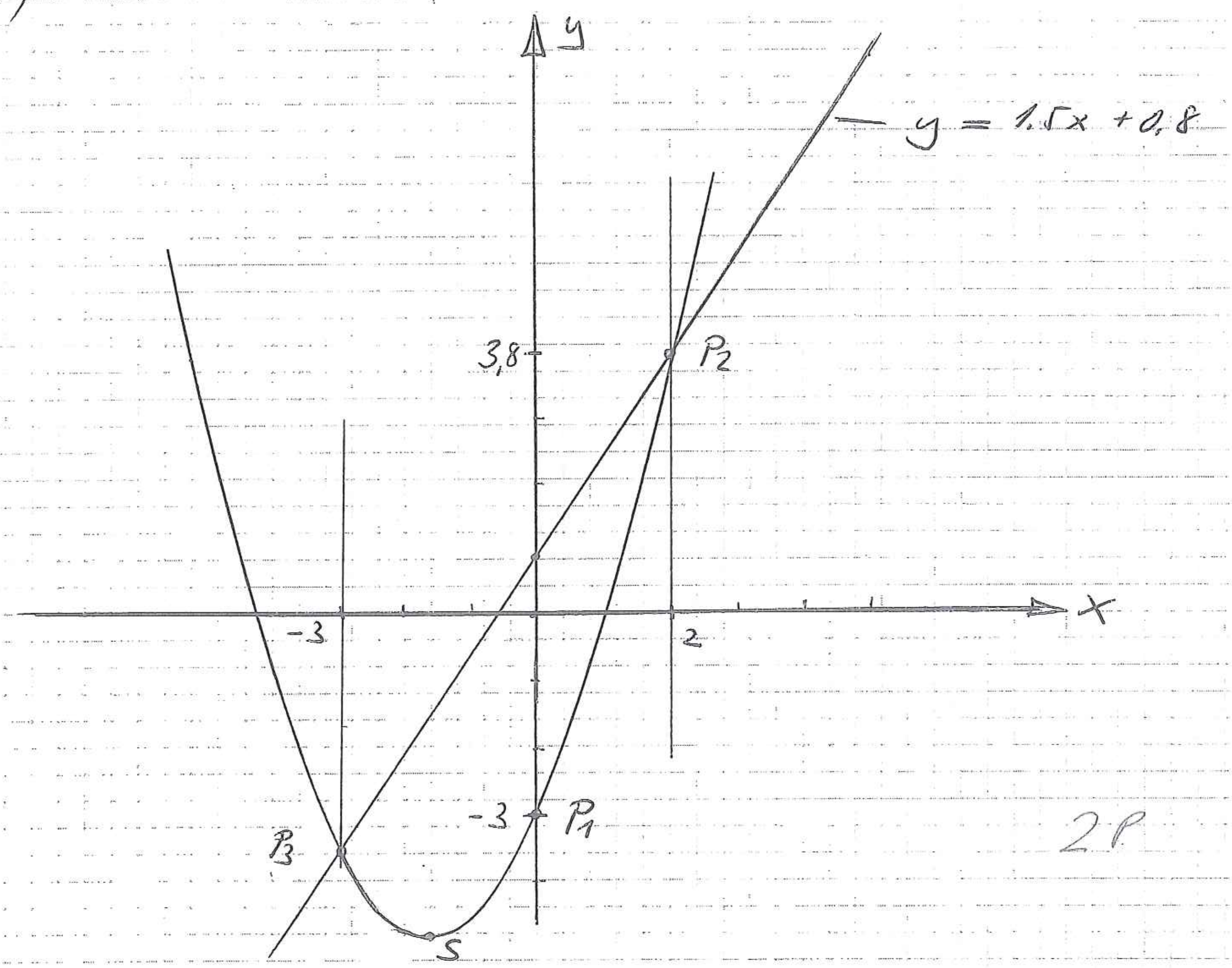
a) $\vec{v_1} = \begin{pmatrix} 3 \\ 3 \end{pmatrix}$ $\vec{v_2} = \begin{pmatrix} -7 \\ 3 \end{pmatrix}$

b) $y = 0{,}5(x-6)^2 - 2$ $y = 0{,}5(x+4)^2 - 2$

oder $y = 0{,}5x^2 - 6x + 16$ $y = 0{,}5x^2 + 4x + 6$

2 P

6)



2P

P_2 : $y = 1,5x + 0,8$
$y = 1.5 \cdot 2 + 0,8 = 3,8$ | $\underline{P_2(2/3,8)}$

P_3 : $y = 1,5x + 0,8$
$y = 1.5(-3) + 0,8 = -3,7$ | $\underline{P_3(-3/-3,7)}$

P : $y = ax^2 + bx + c$

$$\begin{array}{l|rcl|l} \text{I} & -3 & = & c & (P_1) \\ \text{II} & 3,8 & = & 4a + 2b + c & (P_2) \\ \text{III} & -3,7 & = & 9a - 3b + c & (P_3) \end{array}$$

mit TR : $a = 0,633$
$b = 2,133$
$c = -3$

$\Rightarrow y = \underline{0,6\overline{3}x^2 + 2,1\overline{3}x - 3}$

$\underline{S(-1,68/-4,}$

Lösungen:

BM-Math. Prüfung: Lineare- und Quadratische Funktionen / GSBM

1. Aufgabe: Der Graph ist eine Gerade. Wie lautet die Funktionsgleichung?

a) $y = -\frac{5}{4}x + 2{,}25$

b) $x = -2$ (keine Fkt.)

c) $y = \frac{2}{3}x - \frac{2}{3}$

d) $y = -\frac{1}{5}x + \frac{9}{5}$

2 Aufgabe

a)
$$y = -8\left[x^2 - 3x - 1{,}5\right]$$
$$y = -8\left[x^2 - 3x + 1{,}5^2 - 1{,}5^2 - 1{,}5\right]$$
$$y = -8\left[(x - 1{,}5)^2 - 3{,}75\right]$$
$$y = -8(x - 1{,}5)^2 + 30$$
$S(1{,}5 / 30)$

b)
$$y = x^2 - x + 0$$
$$y = x^2 - x + 0{,}5^2 - 0{,}5^2$$
$$y = (x - 0{,}5)^2 - 0{,}25$$
$S(0{,}5 / -0{,}25)$

c)
$$y = 2\left[x^2 + 7x - 5x - 35\right]$$
$$y = 2\left[x^2 + 2x - 35\right]$$
$$y = 2\left[x^2 + 2x + 1 - 1 - 35\right]$$
$$y = 2\left[(x+1)^2 - 36\right]$$
$$y = 2(x+1)^2 - 72$$
$S(-1 / -72)$

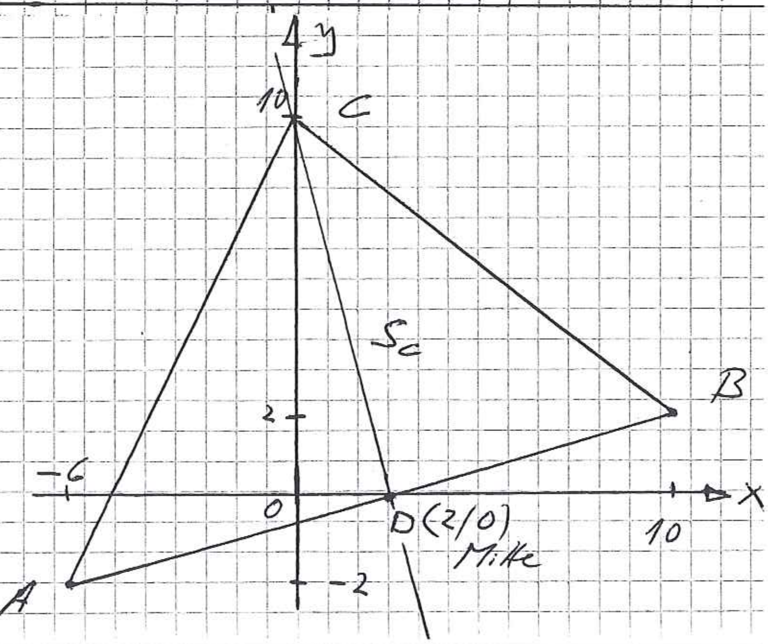
3. Auf.

Steigung von Sc:

$$m = \frac{\Delta y}{\Delta x} = \frac{-10}{2} = -5$$

Geradengl. von Sc:

$$y = mx + b$$
$$y = -5x + 6$$



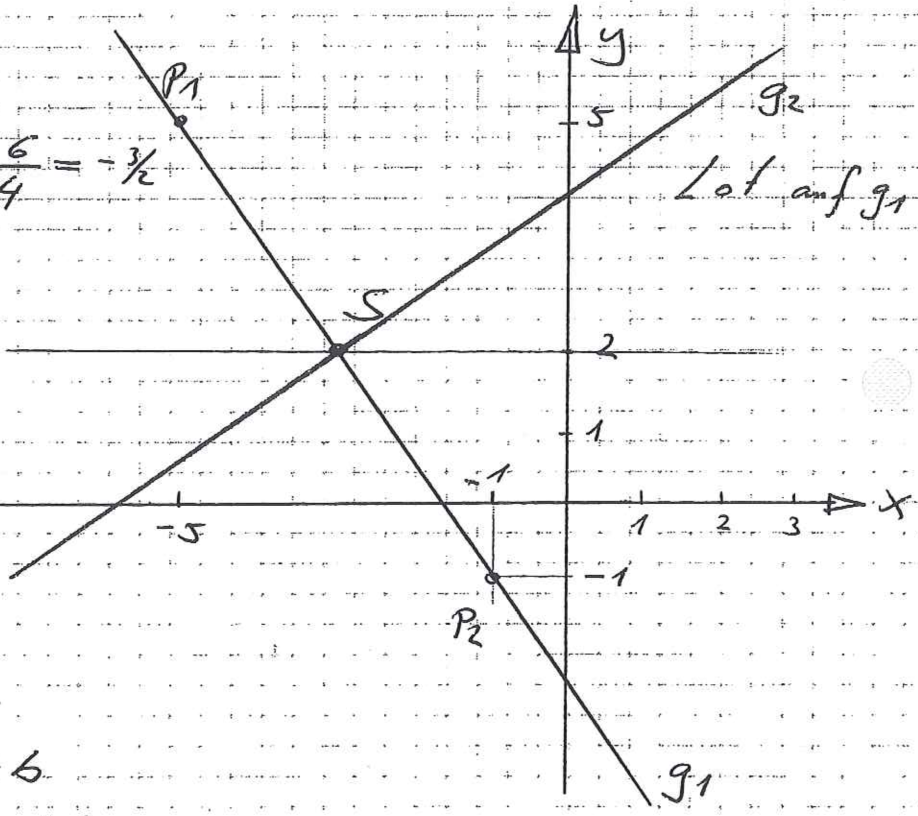
$$y = -5x + b$$

$$b = 10 \quad (\text{aus Skizze})$$

$$\Rightarrow \quad \underline{\underline{y = -5x + 10}}$$

---

4. Auf.



m_1: $\quad m_1 = \frac{\Delta y}{\Delta x} = -\frac{6}{4} = -\frac{3}{2}$

$$m_1 = -1{,}5$$

m_2: $\quad m_2 = -\frac{1}{m_1}$

$$\underline{m_2 = +\frac{2}{3}}$$

a) **Fkt. der Gerade g1**

$$y = ax + b$$
$$y = -1{,}5x + b$$

$P_2 \Rightarrow \quad -1 = -1{,}5(-1) + b \Rightarrow b = -2{,}5$

f_1: $\quad \underline{\underline{y = -1{,}5x - 2{,}5}}$

b) **Fkt. Gl. der Gerade g2**

$$y = ax + b$$
$$y = \frac{2}{3}x + b$$

$S \Rightarrow \quad 2 = \frac{2}{3} \cdot (-3) + b$

$$b = 4$$

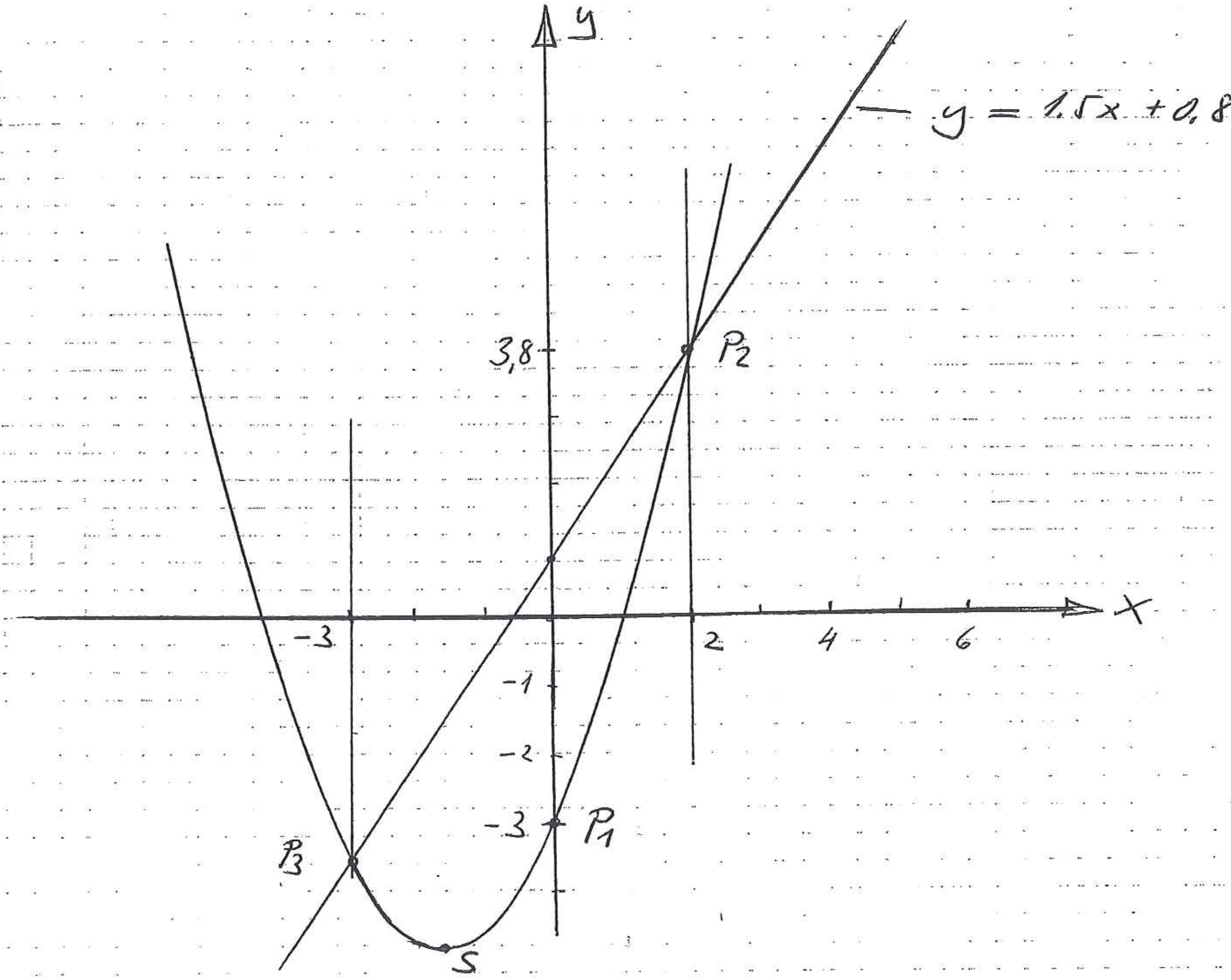
f_2: $\quad \underline{\underline{y = \frac{2}{3}x + 4}}$

Schnittpunkt S

$$y = -1{,}5x - 2{,}5$$
$$2 = -1{,}5x - 2{,}5$$
$$x = -3$$

$$\underline{S(-3/2)}$$

5)



P_2 :
$y = 1{,}5x + 0{,}8$
$y = 1.5 \cdot 2 + 0{,}8 = 3{,}8$ | $\underline{P_2(2/3{,}8)}$

P_3 :
$y = 1{,}5x + 0{,}8$
$y = 1.5(-3) + 0{,}8 = -3{,}7$ | $\underline{P_3(-3/-3{,}7)}$

P: $y = ax^2 + bx + c$

I	$-3 = c$	(P_1)
II	$3{,}8 = 4a + 2b + c$	(P_2)
III	$-3{,}7 = 9a - 3b + c$	(P_3)

mit TR: $a = 0{,}633$
$b = 2{,}133$
$c = -3$

$\Rightarrow y = \underline{\underline{0{,}6\bar{3}x^2 + 2{,}1\bar{3}x - 3}}$

$\underline{\underline{S(-1{,}68/}}$

6a) <u>Nullstellen</u>

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

$(x-1)(x+3) = 0 \Rightarrow x_1 = 1$

$x_2 = -3$

$P_1(1/0)$ $P_2(-3/0)$

b) <u>Scheitelpkt.</u>

$y = x^2 + 2x - 3$

$y = \underbrace{x^2 + 2x + 1} - 1 - 3$

$y = (x+1)^2 - 4$

$S(-1/-4)$

c) <u>Schnittpunkte</u>

$g \cap p$

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

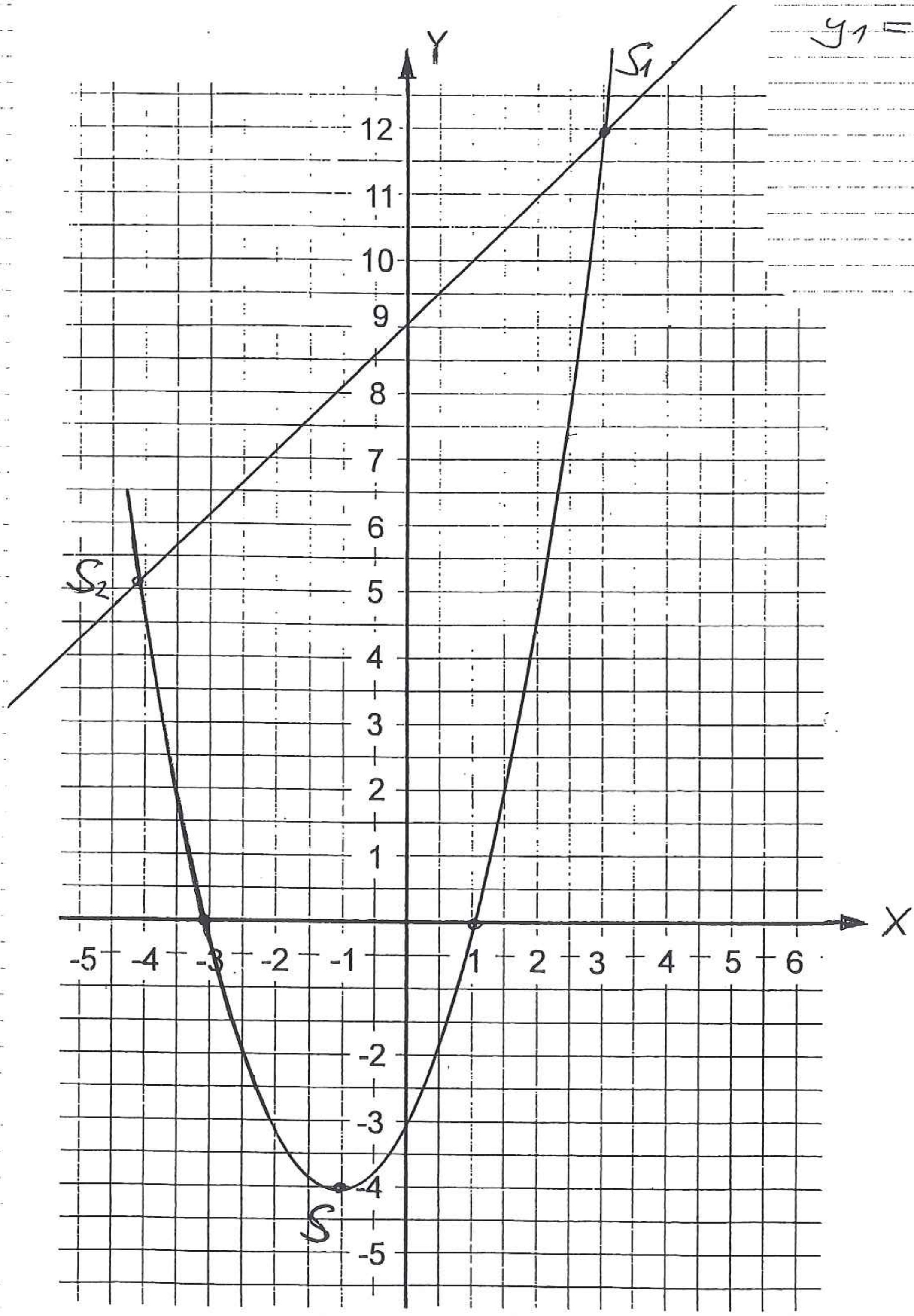
$0 = x^2 + x - 12$

$x_1 = -4$ | $x_2 = 3$

$y_1 = 5$ | $y_2 = 12$

$S_1(3/12)$

$S_2(-4/$[illegible]$)$



Lösung: E)

BM-Math. Prüfung: Lineare- und Quadratische Funktionen

1) a) $y = x + 5$ d) $y = 0{,}5x - 2$

b) $y = -3/4\,x + 5$ e) $y = -1$

c) $y = -2x + 1$

---

2) a)
$$y = x^2 + 12x - 9$$
$$y = \underbrace{x^2 + 12x + 6^2}\underbrace{- 6^2 - 9}$$
$$y = (x+6)^2 - 45$$
$S(-6/-45)$

b) $y = 2x^2 + 2$ $S(0/2)$

c)
$$y = 3\left[x^2 + \tfrac{2}{3}x - \tfrac{5}{3}\right]$$
$$y = 3\left[x^2 + \tfrac{2}{3}x + \tfrac{1}{3}^2 - \tfrac{1}{3}^2 - \tfrac{5}{3}\right]$$
$$y = 3\left[\left(x + \tfrac{1}{3}\right)^2 - \tfrac{16}{9}\right]$$
$$y = 3\left(x + \tfrac{1}{3}\right)^2 - \tfrac{16}{3}$$
$S(-1/3 / -16/3)$

---

3) Steigung von g_2:

a) $a_2 = -\dfrac{1}{a_1} = -\dfrac{1}{-0{,}5} = 2$

g_2: $y = 2x + b$

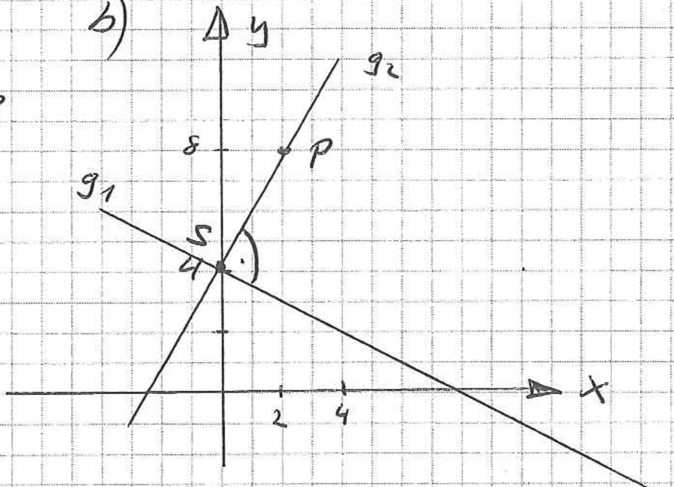
P einsetzen: $8 = 2 \cdot 2 + b \Rightarrow b = 4$

$y = 2x + 4$

Schnittpunkt S: $g_1 \cap g_2$

$$2x + 4 = -0{,}5x + 4$$
$$2{,}5x = 0$$
$$x = 0 \Rightarrow y = 4$$
$S(0/4)$

b)

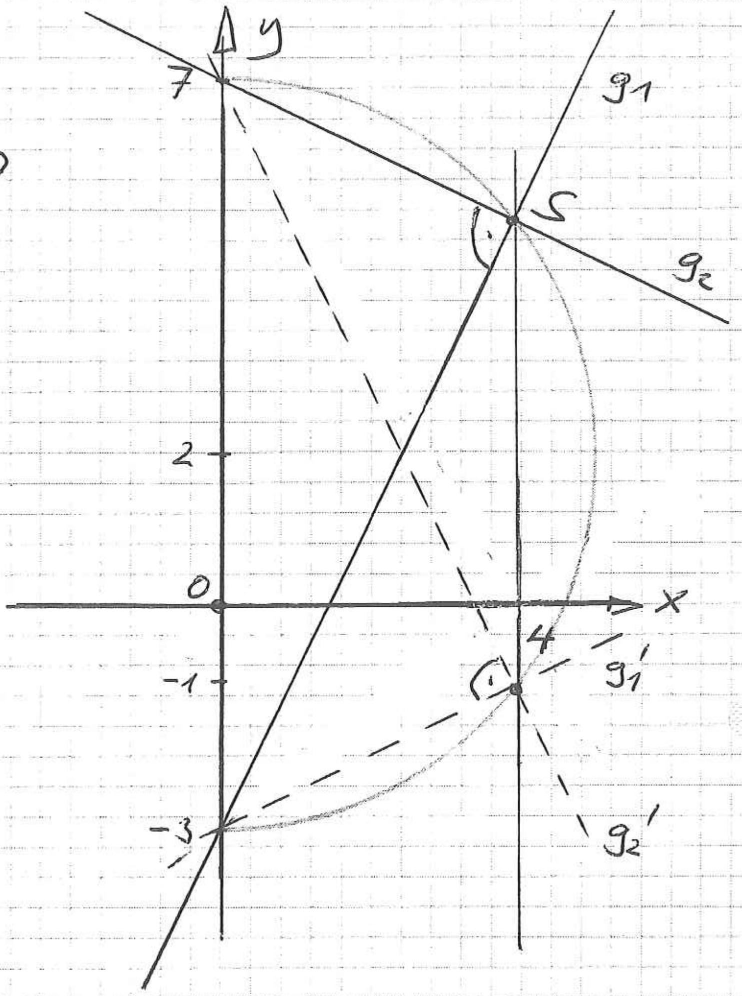


4)

$g_1: \quad y = ax + b = ax - 3$

$g_2: \quad y = \frac{1}{-a}x + b = \frac{1}{-a}x + 7$

Lot auf g1



$g_1 \cap g_2 \Rightarrow S$

$ax - 3 = \frac{1}{-a}x + 7$

$x = 4$ einsetzen

$4a - 3 = \frac{4}{-a} + 7$

$4a^2 - 10a + 4 = 0$

mit TR: $a_1 = 2$

$a_2 = 0{,}5$

1. Lösung $S(4/5)$

$g_1: \quad \underline{\underline{y = 2x - 3}}$ $\qquad g_2: \quad \underline{\underline{y = -0{,}5x + 7}}$

2. Lösung $S(4/-1)$

$g_1': \quad \underline{\underline{y = 0{,}5x - 3}}$ $\qquad g_2': \quad \underline{\underline{y = -2x + 7}}$

---

5) $p_1 \cap p_2$

a) $(x+2)^2 - 1 = 0{,}5x^2 + 2x + 3{,}75$

$x^2 + 4x + 3 = 0{,}5x^2 + 2x + 3{,}75$

$\underline{0{,}5x^2 + 2x - 0{,}75 = 0}$

$x_1 = 0{,}345 \qquad y_1 = 4{,}5 \Rightarrow \underline{\underline{P_1(0{,}3452/4{,}5)}}$

$x_2 = -4{,}34521 \qquad y_2 = 4{,}5 \Rightarrow \underline{\underline{P_2(-4{,}345/4{,}5)}}$

b) $y = ax + b$

$a = \frac{\Delta y}{\Delta x} = \frac{0}{\Delta x} = 0 \quad \Big| \quad \underline{\underline{y = 4{,}5}}$

6)

$f_1 \cap f_2$

a) $-x + 3,5 = -4x + 5$

$3x = 1,5$

$x = 0,5$

$y = 3$ $\qquad P_1 (0,5 / 3)$

$f_2 \cap f_3$

$-4x + 5 = x - 7,5$

$12,5 = 5x$

$x = 2,5$

$y = -5$ $\qquad P_2 (2,5 / -5)$

$f_1 \cap f_3$

$-x + 3,5 = x - 7,5$

$-2x = -11$

$x = 5,5$

$y = -2$ $\qquad P_3 (5,5 / -2)$

b) $y = ax^2 + bx + c$

$$\begin{array}{l|l} I & 3 = 0,25a + 0,5b + c \\ II & -5 = 2,5^2 a + 2,5b + c \\ III & -2 = 5,5^2 a + 5,5b + c \end{array}$$

$a = 1 \qquad b = -7 \qquad c = 6,25$

$y = x^2 - 7x + 6,25$

c) $y = x^2 - 7x + 3,5^2 - 3,5^2 + 6,25$

$y = (x - 3,5)^2 - 6$ $\qquad S (3,5 / -6)$

Lösungen F)

BM-Math. Prüfung: Lineare- und quadratische Funktionen

1) a) $y = \frac{1}{3}x$

b) $y = -2{,}5x$

c) $y = \frac{1}{3}x + 3$

d) $y = 7$

e) $y = -x - 4$

f) $y = -0{,}8x - 7{,}8$

g) $y = 2{,}5x - 11{,}5$

2R → ½P
4R → 1P
5R → 1½P
7R → 2P

2P

---

2) a)
$$y = x^2 - 6x + 10$$
$$y = \underbrace{x^2 - 6x + 3^2}\ \underbrace{- 3^2 + 10}$$
$$y = (x-3)^2 + 1$$
$S(3/1)$

b)
$$y = -\frac{1}{3}x^2 + x - 2$$
$$y = -\tfrac{1}{3}\left[x^2 - 3x + 6\right]$$
$$y = -\tfrac{1}{3}\left[x^2 - 3x + (\tfrac{3}{2})^2 - (\tfrac{3}{2})^2 + 6\right]$$
$$y = -\tfrac{1}{3}\left[(x - 1{,}5)^2 - \tfrac{9}{4} + 6\right]$$
$$y = -\tfrac{1}{3}\left[(x - 1{,}5)^2 + \tfrac{15}{4}\right]$$
$$y = -\tfrac{1}{3}(x - 1{,}5)^2 - \frac{5}{4}$$
$S(\tfrac{3}{2} | -\tfrac{5}{4})$

c)
$$y = (4 + 2x)^2 = 2\cdot(x+2)\cdot 2\cdot(x+2)$$
$$y = 4(x+2)^2$$
$S(-2/0)$

2P

---

c) 2. Lösungsweg
$$y = (4+2x)^2 = 4x^2 + 16x + 16$$
$$y = 4\left[x^2 + 4x + 4\right]$$
$$y = 4\left[\underbrace{x^2 + 4x + 2^2}\ \underbrace{- 2^2 + 4}_{\emptyset}\right]$$
$$y = 4\left[(x+2)^2\right]$$
$S(-2/0)$

3)

Steigung von Lot:

$m = -\frac{1}{-1/6} = 6$

Fkt. Gl. von Lot:

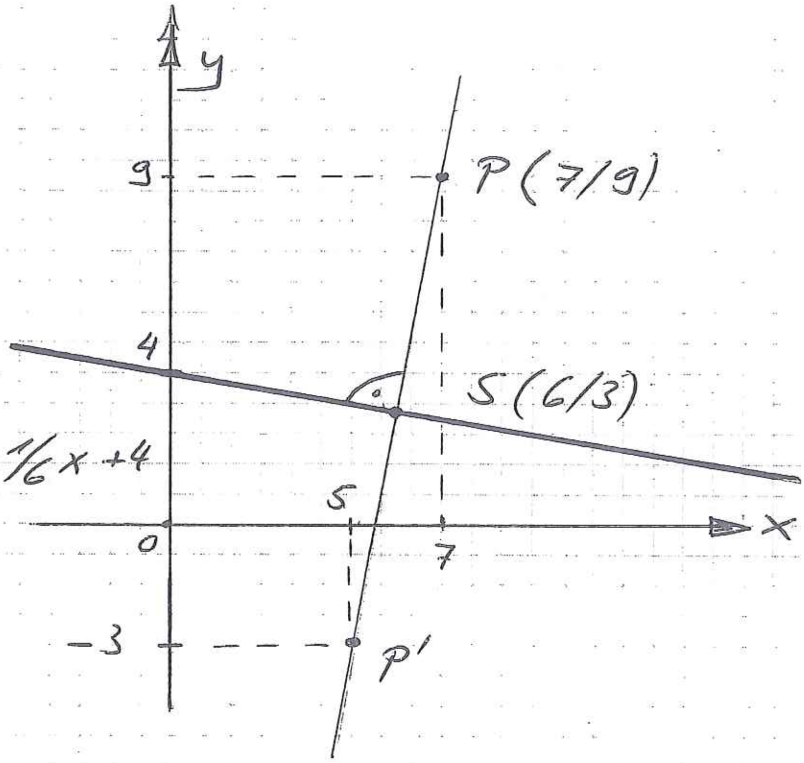
$y = 6x + b$

Punkt P einsetzen:

$9 = 6 \cdot 7 + b$

$b = -33$

$\underline{y = 6x - 33}$



Schnittpunkt S:

$-\frac{1}{6}x + 4 = 6x - 33$

$x = 6$

$y = -\frac{1}{6} \cdot 6 + 4 = 3$ $\Big\}$ $\underline{S(6/3)}$

$\Rightarrow \underline{\underline{P'(5/-3)}}$

2P

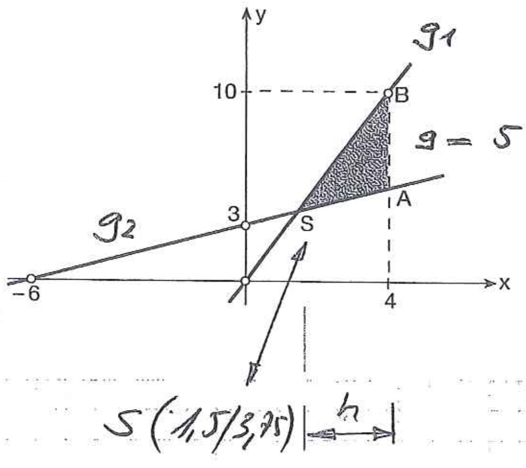
---

4) Funkt. Gl. von:

g_1: $y = \frac{3}{6}x + 3$

$\underline{y = \frac{1}{2}x + 3}$

g_2: $\underline{y} = \frac{10}{4}x = \underline{2{,}5x}$



Schnittpunkt S

$g_1 \cap g_2$

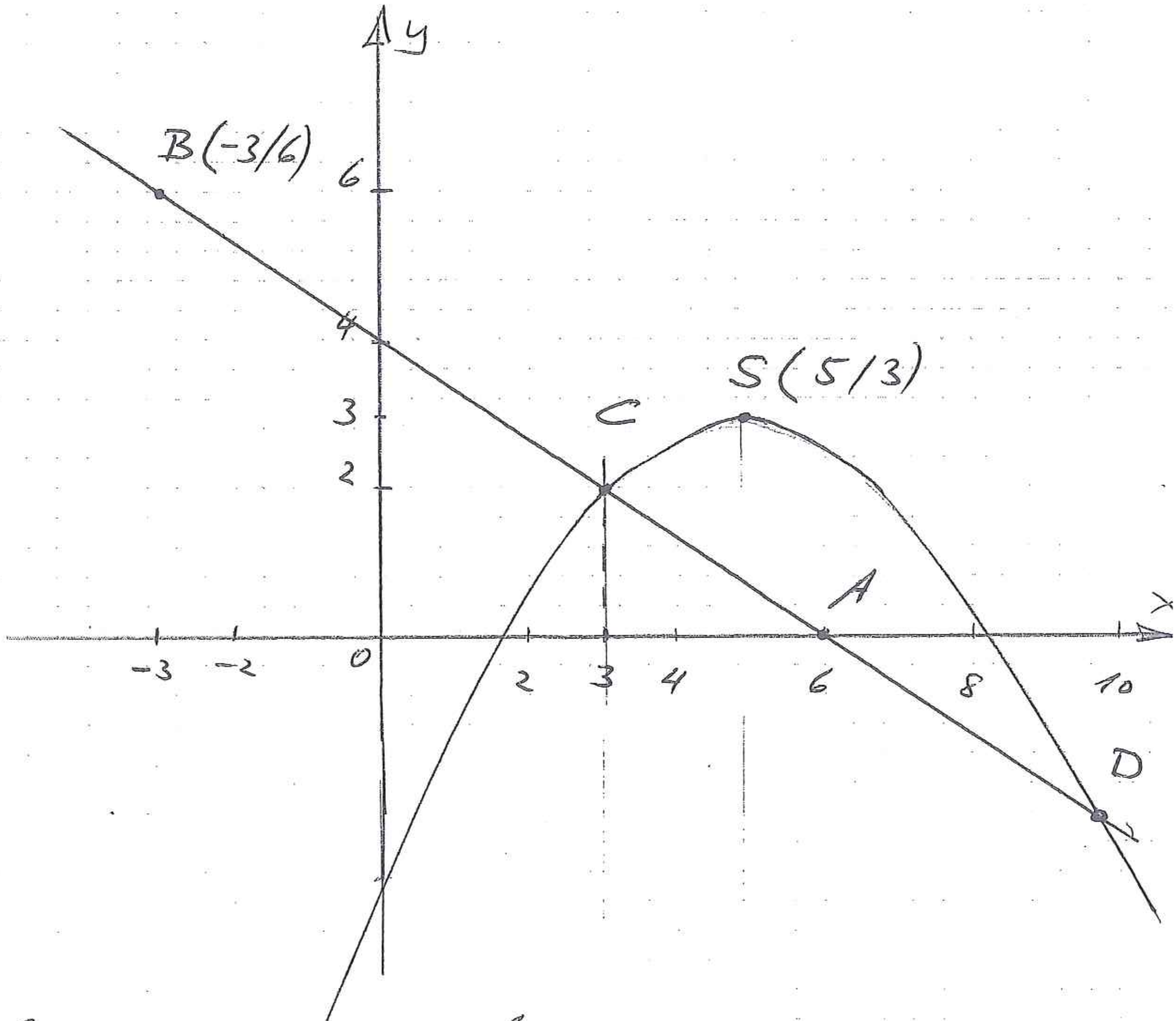
$\frac{1}{2}x + 3 = 2{,}5x \Rightarrow x = 1{,}5$

$y = 3{,}75$

$$A = \frac{g \cdot h}{2} = \frac{5 \cdot (4-1{,}5)}{2} = \underline{\underline{6{,}25\ cm^2}}$$ 2P

---

5)



Gerade: $y = ax + b$

$a = -\frac{6}{9} = -2/3$

$y = -2/3\,x + b$

$A(6/0) \Rightarrow 0 = -2/3 \cdot 6 + b \Rightarrow b = 4$

$$\underline{\underline{y = -2/3\,x + 4}}$$

$C(3/y_c)$ $\quad y_c = -2/3 \cdot 3 + 4 = 2 \Rightarrow \underline{\underline{C(3/2)}}$

a) Bestimmung der Fkt. Gl. der Parabel

$S(5/3) \qquad C(3/2)$

2P

$y = a(x - x_s)^2 + y_s$

$S(5/3) \rightarrow \quad y = a(x-5)^2 + 3$

$C(3/2) \rightarrow \quad 2 = a(3-5)^2 + 3$

$2 = a(-2)^2 + 3 = 4a + 3$

$a = -1/4$

$$y = -1/4(x-5)^2 + 3 = -1/4x^2 + 2{,}5x - \frac{13}{4}$$

Schnittpunkt D

$g \cap p$

$-2/3x + 4 = -1/4x^2 + 2{,}5x - 13/4$

mit TR $\quad x_1 = 3$

$x_2 = 9{,}6\overline{6} = 9\,2/3$

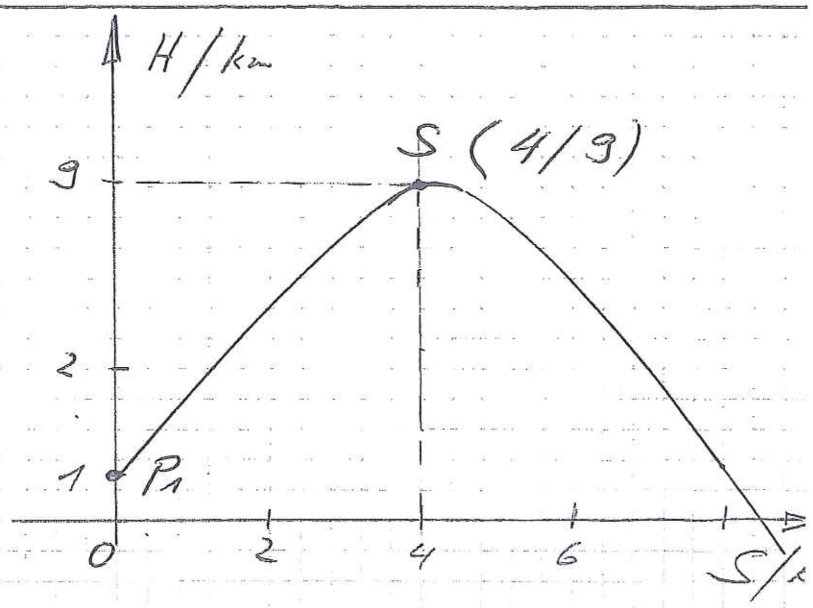
$y_2 = -2/3 \cdot 9{,}\overline{6} + 4 = -22/9$

$D(9\,2/3 / -22/9)$

---

6) Geg: $S(4/9)$

$P_1(0/1)$



Schaitelform:

$y = a(x - x_S)^2 + y_S$

$S \Rightarrow y = a(x-4)^2 + 9$

$P_1 \Rightarrow 1 = a(0-4)^2 + 9$

$1 = 16a + 9$

$a = -1/2$

$$y = -1/2(x-4)^2 + 9 = -1/2x^2 + 4x + 1$$

Total 12P

2P

7)

Lösungen

BM-Math. Prüfung: Lineare- und quadratische Funktionen / GSBM

1) a) $y = \frac{1}{3}x$

b) $y = -2,5x$

c) $y = \frac{1}{3}x + 3$

d) $y = 7$

e) $y = -x - 4$

f) $y = -9,8x - 7,8$

g) $y = 2,5x - 11,5$

7+6R → 2P
5R → 1½
4R → 1
3R → ½
2R → ½
1R → 0

---

2) a)
$y = x^2 - 6x + 10$
$y = x^2 - 6x + 3^2 - 3^2 + 10$
$y = (x-3)^2 + 1$ $S(3/1)$

b)
$y = -\frac{1}{3}x^2 + x - 2$
$y = -\frac{1}{3}[x^2 - 3x + 6]$
$y = -\frac{1}{3}[x^2 - 3x + (\frac{3}{2})^2 - (\frac{3}{2})^2 + 6]$
$y = -\frac{1}{3}[(x-1,5)^2 - \frac{9}{4} + 6]$
$y = -\frac{1}{3}[(x-1,5)^2 + \frac{15}{4}]$
$y = -\frac{1}{3}(x-1,5)^2 - \frac{5}{4}$ $S(\frac{3}{2} | -\frac{5}{4})$

c)
$y = (4+2x)^2 = 2\cdot(x+2)\cdot 2\cdot(x+2)$
$y = 4(x+2)^2$ $S(-2/0)$

---

c) 2. Lösungsweg

$y = (4+2x)^2 = 4x^2 + 16x + 16$
$y = 4[x^2 + 4x + 4]$
$y = 4[x^2 + 4x + 2^2 - 2^2 + 4]$ (→ 0)
$y = 4[(x+2)^2$ $S(-2/0)$

3a) $y = \frac{3}{2}x + 2 \Rightarrow m_1 = \frac{3}{2}$

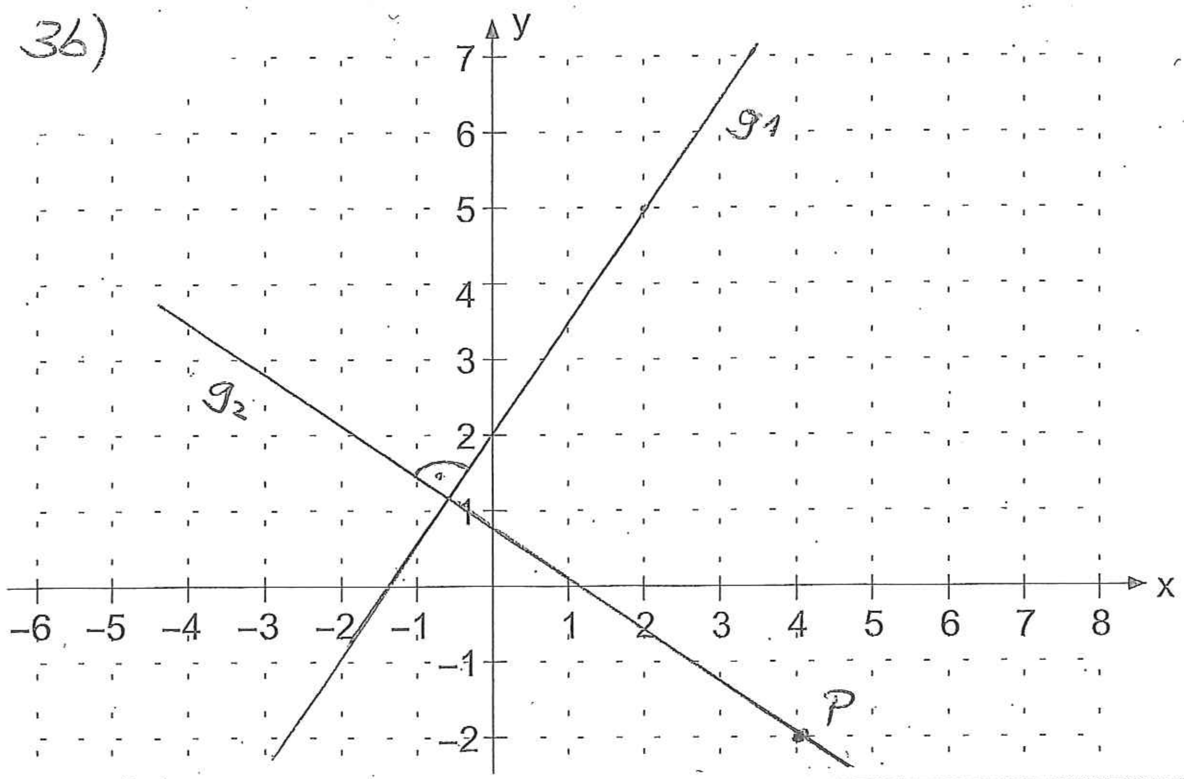
Lot: $m_2 = -\frac{2}{3}$

$g_2: \; y = -\frac{2}{3}x + b$

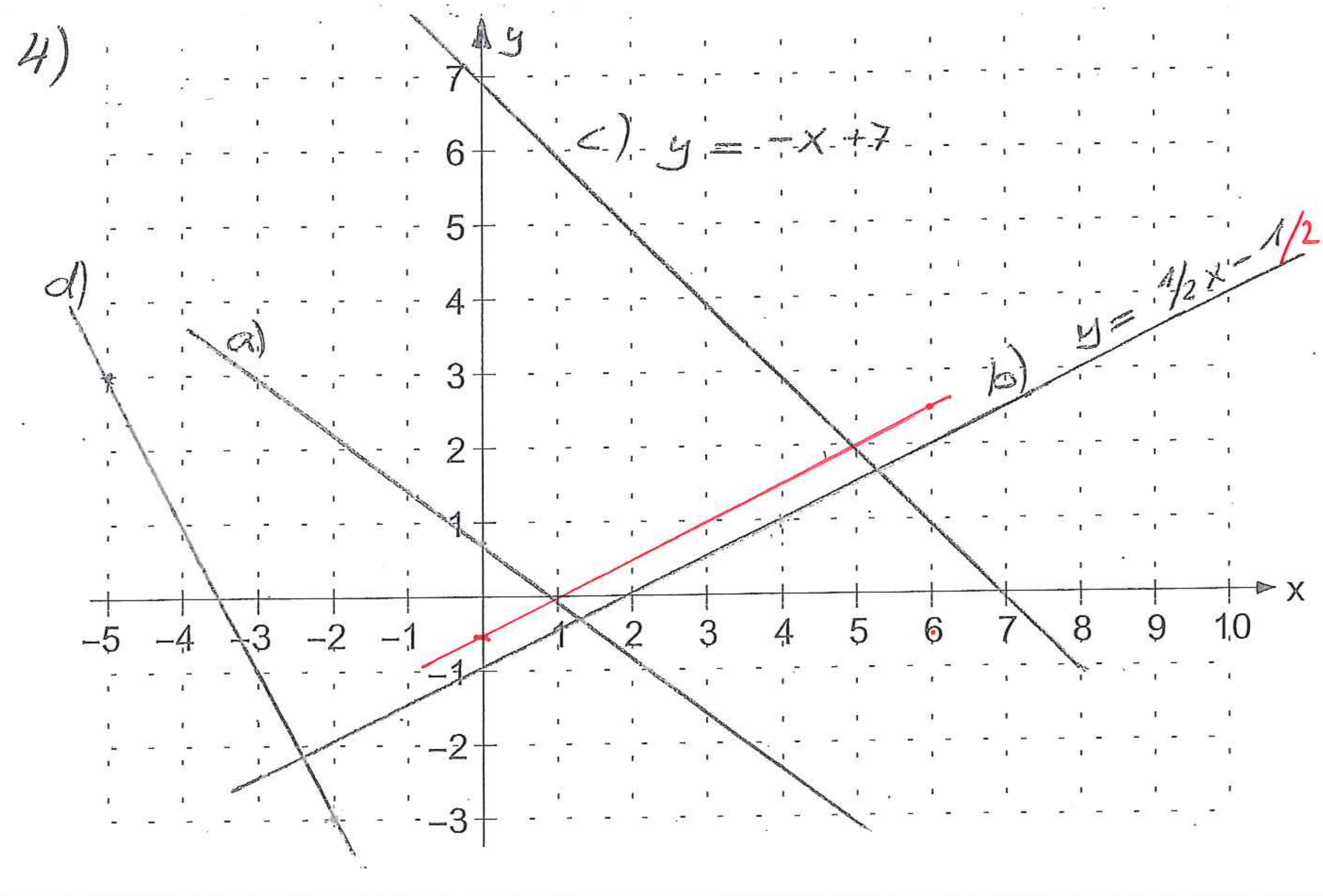
$P(4|-2) \Rightarrow \; -2 = -\frac{2}{3} \cdot 4 + b \quad | \quad b = \frac{2}{3}$

$\underline{\underline{y = -2/3\, x + 2/3}}$

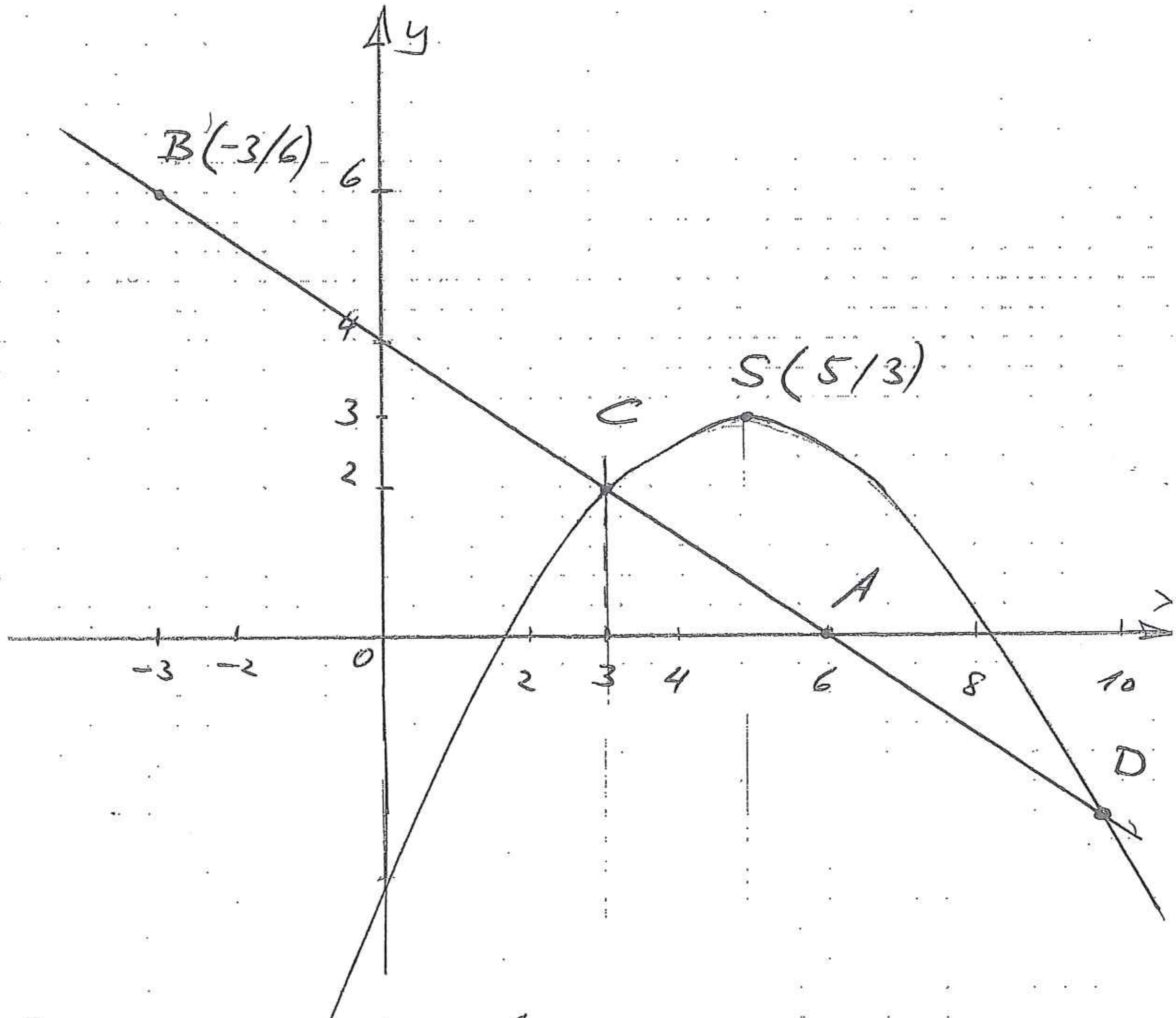
3b)



4)



5)



Gerade: $y = ax + b$

$a = -\frac{6}{9} = -2/3$

$y = -2/3\,x + b$

$A(6/0) \Rightarrow 0 = -2/3 \cdot 6 + b \Rightarrow b = 4$

$\underline{\underline{y = -2/3\,x + 4}}$

$C(3/y_c)$ $y_c = -2/3 \cdot 3 + 4 = 2 \Rightarrow \underline{\underline{C(3/2)}}$

a) Bestimmung der Fkt.Gl. der Parabel

$S(5/3)$ $C(3/2)$

$y = a(x - x_s)^2 + y_s$

$S(5/3) \rightarrow \quad y = a(x-5)^2 + 3$

$C(3/2) \rightarrow \quad 2 = a(3-5)^2 + 3$

$2 = a(-2)^2 + 3 = 4a + 3$

$a = -1/4$

$$y = -1/4(x-5)^2 + 3 = -1/4\,x^2 + 2{,}5x - \frac{13}{4}$$

Schnittpunkt D

$g \cap p$

$-2/3\,x + 4 = -1/4\,x^2 + 2{,}5x - 13/4$

mit TR $\quad x_1 = 3$

$x_2 = 9{,}6\overline{6} = 9\,2/3$

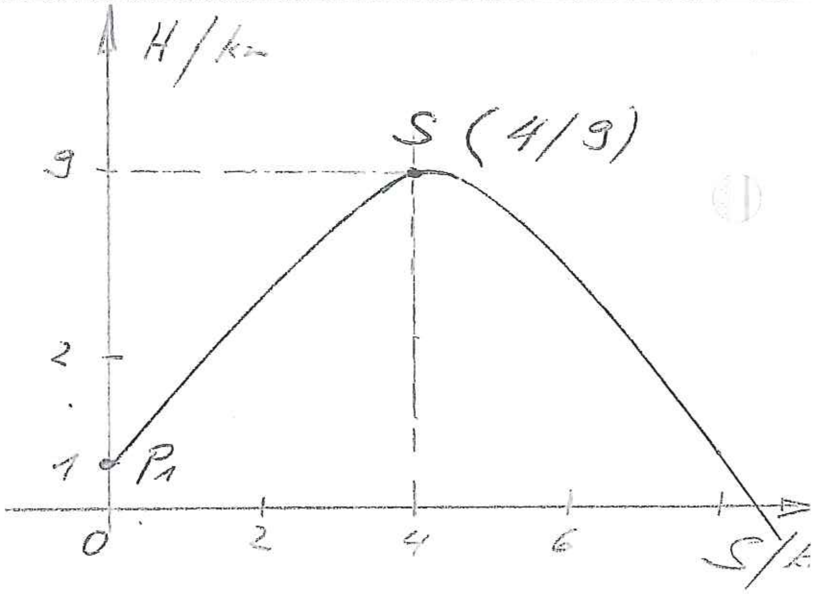
$y_2 = -2/3 \cdot 9{,}\overline{6} + 4 = -22/9$

$D(9\,2/3 \,/\, -22/9)$

---

6) Geg: $S(4/9)$

$P_1(0/1)$



Schteitelform:

$y = a(x - x_S)^2 + y_S$

$S \Rightarrow y = a(x-4)^2 + 9$

$P_1 \Rightarrow 1 = a(0-4)^2 + 9$

$1 = 16a + 9$

$a = -1/2$

$$y = -1/2(x-4)^2 + 9 = -1/2\,x^2 + 4x + 1$$