

## AG3.4 Geraden (Lösungen)

### Lösungen Maturaufgaben:

- 1) Gehe zum Aufgabenpool Mathematik AHS: <https://prod.aufgabenpool.at/amn/index.php?id=M>
- 2) Gib im Feld „**Volltextsuche**“ die **Nummer** ein. Du kommst zur zugehörigen Aufgabe. Die Lösungen sind bei der Aufgabe enthalten.

Grundkompetenz

Aufgabentyp ▾

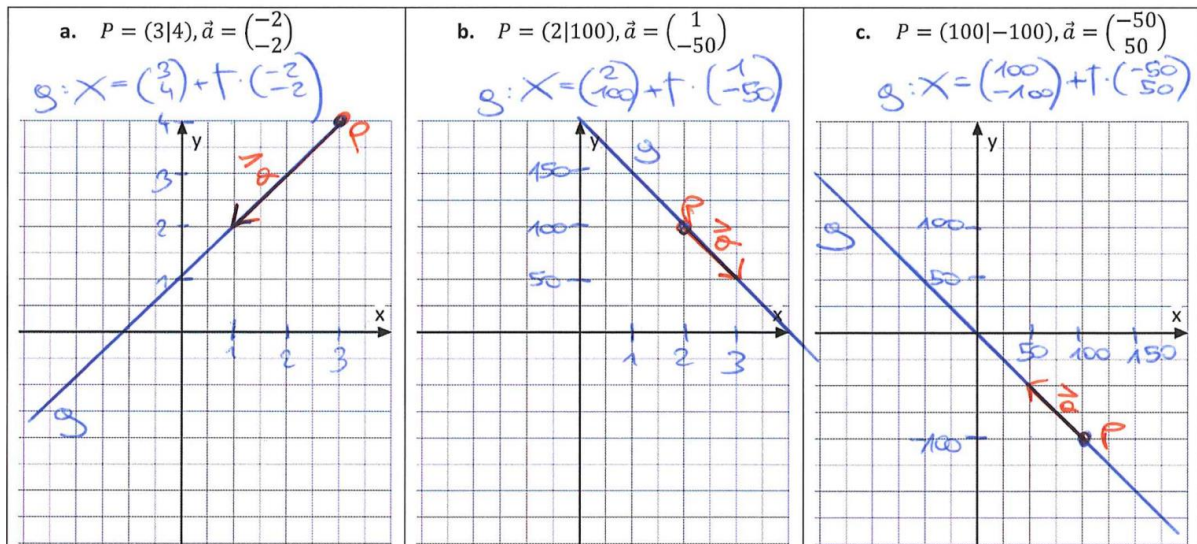
Schulstufe ▾

Volltextsuche

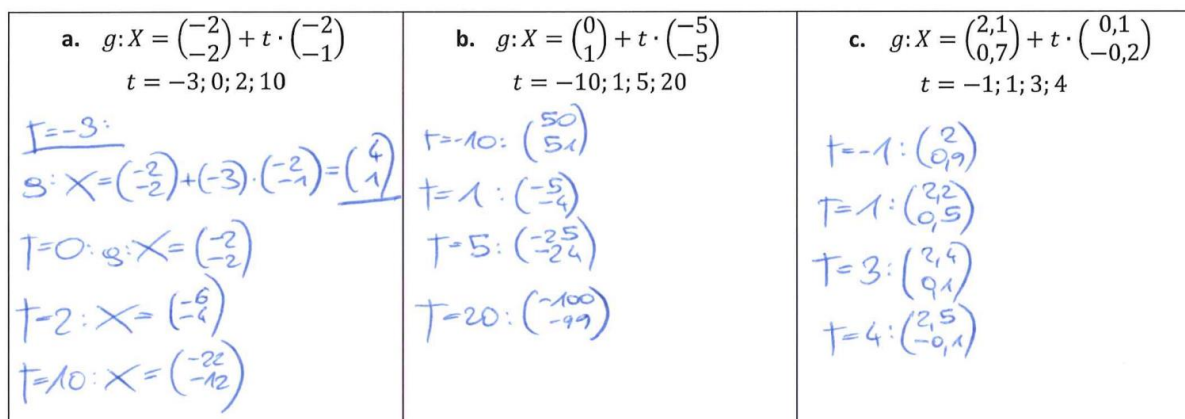
Angestelltenghalt\* 1\_578, AN1.1, Offenes Antwortformat

↑  
Nummer

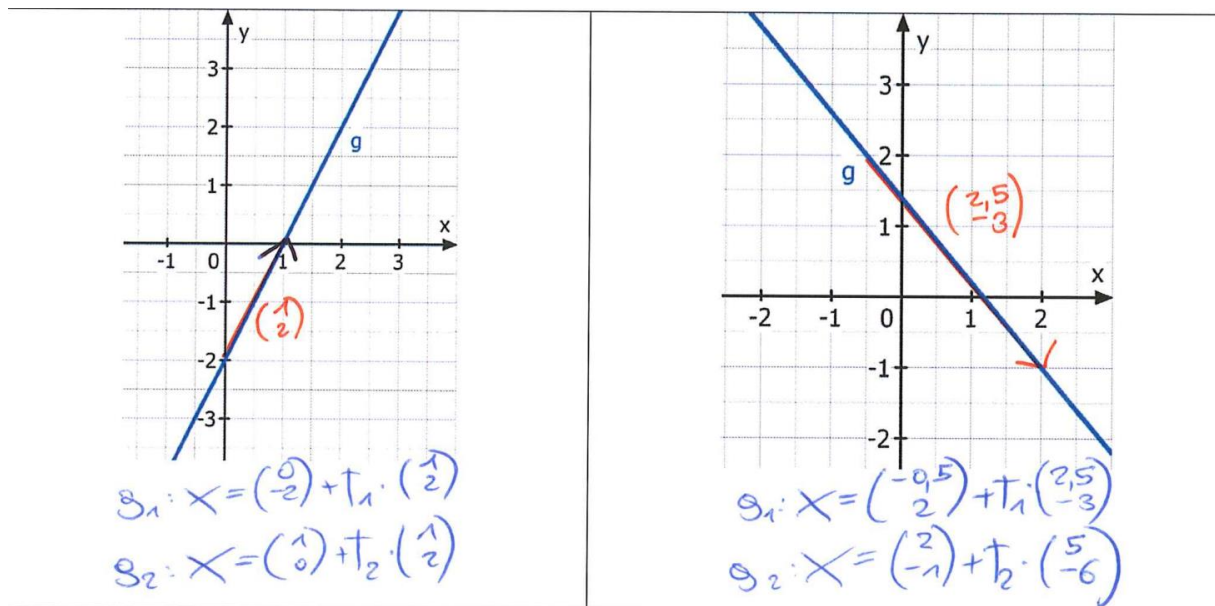
Bsp. 1)



Bsp. 2)



Bsp. 3)



Bsp. 4)

<p>a. <math>P = (3 4 1), \vec{a} = \begin{pmatrix} -1 \\ 3 \\ -2 \end{pmatrix}</math></p> <p><math>g: X = \begin{pmatrix} 3 \\ 4 \\ 1 \end{pmatrix} + t \cdot \begin{pmatrix} -1 \\ 3 \\ -2 \end{pmatrix}</math></p> <p>① <math>t=1: X = \begin{pmatrix} 3 \\ 4 \\ 1 \end{pmatrix} + 1 \cdot \begin{pmatrix} -1 \\ 3 \\ -2 \end{pmatrix} = \begin{pmatrix} 2 \\ 7 \\ -1 \end{pmatrix}</math></p> <p>② <math>t=-2: X = \begin{pmatrix} 3 \\ 4 \\ 1 \end{pmatrix} + (-2) \cdot \begin{pmatrix} -1 \\ 3 \\ -2 \end{pmatrix} = \begin{pmatrix} 5 \\ -2 \\ 5 \end{pmatrix}</math></p> <p>③ <math>t=10: X = \begin{pmatrix} 3 \\ 4 \\ 1 \end{pmatrix} + 10 \cdot \begin{pmatrix} -1 \\ 3 \\ -2 \end{pmatrix} = \begin{pmatrix} -7 \\ 34 \\ -19 \end{pmatrix}</math></p> <p>Werte für t können beliebig gewählt werden!</p>	<p>b. <math>P = (-1 7 4), \vec{a} = \begin{pmatrix} -4 \\ 12 \\ 2 \end{pmatrix}</math></p> <p><math>g: X = \begin{pmatrix} -1 \\ 7 \\ 4 \end{pmatrix} + t \cdot \begin{pmatrix} -4 \\ 12 \\ 2 \end{pmatrix}</math></p> <p>① <math>t=2: \begin{pmatrix} -1 \\ 7 \\ 4 \end{pmatrix} + 2 \cdot \begin{pmatrix} -4 \\ 12 \\ 2 \end{pmatrix} = \begin{pmatrix} -9 \\ 31 \\ 8 \end{pmatrix}</math></p> <p>② <math>t=-5: \begin{pmatrix} -1 \\ 7 \\ 4 \end{pmatrix} + (-5) \cdot \begin{pmatrix} -4 \\ 12 \\ 2 \end{pmatrix} = \begin{pmatrix} 19 \\ -53 \\ -6 \end{pmatrix}</math></p> <p>③ <math>t=-1: \begin{pmatrix} -1 \\ 7 \\ 4 \end{pmatrix} + (-1) \cdot \begin{pmatrix} -4 \\ 12 \\ 2 \end{pmatrix} = \begin{pmatrix} 3 \\ -5 \\ 2 \end{pmatrix}</math></p>	<p>c. <math>P = (13 -4 11), \vec{a} = \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix}</math></p> <p><math>g: X = \begin{pmatrix} 13 \\ -4 \\ 11 \end{pmatrix} + t \cdot \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix}</math></p> <p>① <math>t=10: \begin{pmatrix} 13 \\ -4 \\ 11 \end{pmatrix} + 10 \cdot \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 3 \\ -14 \\ 21 \end{pmatrix}</math></p> <p>② <math>t=-20: \begin{pmatrix} 13 \\ -4 \\ 11 \end{pmatrix} + (-20) \cdot \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 33 \\ 16 \\ 9 \end{pmatrix}</math></p> <p>③ <math>t=5: \begin{pmatrix} 13 \\ -4 \\ 11 \end{pmatrix} + 5 \cdot \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 8 \\ -9 \\ 16 \end{pmatrix}</math></p>
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Bsp. 5)

<p>a. <math>g: X = \begin{pmatrix} 0 \\ 1 \end{pmatrix} + t \cdot \begin{pmatrix} -5 \\ 3 \end{pmatrix} - P = (x 7)</math></p> <p>I <math>\begin{pmatrix} x \\ 7 \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \end{pmatrix} + t \cdot \begin{pmatrix} -5 \\ 3 \end{pmatrix}</math></p> <p>II <math>7 = 1 + 3t + 1 - 1</math></p> <p><math>6 = 3t + 1 : : 3</math></p> <p><math>t = 2</math></p> <p>I <math>\Rightarrow x = 0 - 5t = -10</math></p>	<p>b. <math>g: X = \begin{pmatrix} -3 \\ 6 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ -1 \end{pmatrix} - P = (1 y)</math></p> <p>I <math>\begin{pmatrix} 1 \\ y \end{pmatrix} = \begin{pmatrix} -3 \\ 6 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ -1 \end{pmatrix}</math></p> <p>II <math>1 = -3 - 2t + 1 + 3</math></p> <p><math>4 = -2t + 1 : : (-2)</math></p> <p><math>t = -2</math></p> <p><math>\Rightarrow y = 6 - t = 6 - (-2) = 8</math></p>
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Bsp. 6)

<p>a. <math>g: X = \begin{pmatrix} 2 \\ 1 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ 3 \end{pmatrix} - P_1 = (-4 7), P_2 = (8 -6)</math></p> <p><math>P_1 = (-4 7)</math>  <math>\begin{pmatrix} -4 \\ 7 \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ 3 \end{pmatrix}</math>  <math>I: -4 = 2 - 2t + 1 - 2</math>  <math>-6 = -2t + 1 \cdot (-2)</math>  <math>t = 3</math></p> <p><math>P_2 = (8 -6)</math>  <math>\begin{pmatrix} 8 \\ -6 \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ 3 \end{pmatrix}</math>  <math>I: 8 = 2 - 2t + 1 - 2</math>  <math>6 = -2t + 1 \cdot (-2)</math>  <math>t = -3</math></p> <p><math>II: 7 = 1 + 3t + 1 - 1</math>  <math>6 = 3t + 1 : 3</math>  <math>t = 2</math></p> <p><math>P_1 \notin g</math></p>	<p>b. <math>g: X = \begin{pmatrix} -3 \\ -4 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ 3 \end{pmatrix} - P_1 = (-5 -1), P_2 = (3 5)</math></p> <p><math>P_1 = (-5 -1)</math>  <math>\begin{pmatrix} -5 \\ -1 \end{pmatrix} = \begin{pmatrix} -3 \\ -4 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ 3 \end{pmatrix}</math>  <math>I: -5 = -3 - 2t + 1 + 3</math>  <math>-2 = -2t + 1 \cdot (-2)</math>  <math>t = 1</math></p> <p><math>P_2 = (3 5)</math>  <math>\begin{pmatrix} 3 \\ 5 \end{pmatrix} = \begin{pmatrix} -3 \\ -4 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ 3 \end{pmatrix}</math>  <math>I: 3 = -3 - 2t + 1 + 3</math>  <math>6 = -2t + 1 \cdot (-2)</math>  <math>t = -3</math></p> <p><math>II: 5 = -4 + 3t + 1 + 4</math>  <math>9 = 3t + 1 : 3</math>  <math>t = 3</math></p> <p><math>P_1 \in g</math></p>
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Bsp. 7)

<p>a. <math>g: X = \begin{pmatrix} -7 \\ 1 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ 6 \end{pmatrix} - P = (7 5)</math></p> <p>① <math>g_1: X = \begin{pmatrix} 7 \\ 5 \end{pmatrix} + t_1 \cdot \begin{pmatrix} -2 \\ 6 \end{pmatrix} \quad g_1 \parallel g</math></p> <p>② <math>\vec{n}_g = \begin{pmatrix} 6 \\ 2 \end{pmatrix}</math></p> <p><math>g_2: X = \begin{pmatrix} 7 \\ 5 \end{pmatrix} + t_2 \cdot \begin{pmatrix} 6 \\ 2 \end{pmatrix} \quad g_2 \perp g</math></p>	<p>b. <math>g: X = \begin{pmatrix} -3 \\ 5 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ 4 \end{pmatrix} - P = (-7 1)</math></p>
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Bsp. 8)

<p>a. <math>g: X = \begin{pmatrix} 7 \\ 3 \end{pmatrix} + t \cdot \begin{pmatrix} -8 \\ 1 \end{pmatrix} \quad \vec{n} = \begin{pmatrix} 1 \\ 8 \end{pmatrix}</math></p> <p><math>g_1: X = \begin{pmatrix} 7 \\ 3 \end{pmatrix} + t_1 \cdot \begin{pmatrix} 1 \\ 8 \end{pmatrix}</math></p> <p><math>g_2: X = \begin{pmatrix} 7 \\ 3 \end{pmatrix} + t_2 \cdot \begin{pmatrix} 2 \\ 16 \end{pmatrix}</math></p>	<p>b. <math>g: X = \begin{pmatrix} 4 \\ 5 \end{pmatrix} + t \cdot \begin{pmatrix} -3 \\ -6 \end{pmatrix} \quad \vec{n} = \begin{pmatrix} -6 \\ 3 \end{pmatrix}</math></p> <p><math>g_1: X = \begin{pmatrix} 4 \\ 5 \end{pmatrix} + t_1 \cdot \begin{pmatrix} -3 \\ -6 \end{pmatrix}</math></p> <p><math>g_2: X = \begin{pmatrix} 4 \\ 5 \end{pmatrix} + t_2 \cdot \begin{pmatrix} +6 \\ -3 \end{pmatrix}</math></p>
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Bsp. 9)

<p>a. <math>g: X = \begin{pmatrix} 2 \\ -4 \\ -3 \end{pmatrix} + t \cdot \begin{pmatrix} -5 \\ 3 \\ -2 \end{pmatrix} - P = (x 11 z)</math></p> <p>2. Gleichung:  <math>II: -4 + 3t = 11 + 4</math>  <math>3t = 15 \quad   :3</math>  <math>t = 5</math></p> <p><math>X = \begin{pmatrix} 2 \\ -4 \\ -3 \end{pmatrix} + 5 \cdot \begin{pmatrix} -5 \\ 3 \\ -2 \end{pmatrix} = \begin{pmatrix} 2 \\ -4 \\ -3 \end{pmatrix} + \begin{pmatrix} -25 \\ 15 \\ -10 \end{pmatrix} = \begin{pmatrix} -23 \\ 11 \\ -13 \end{pmatrix}</math></p> <p><math>\Rightarrow x = -23, z = -13</math></p>	<p>b. <math>g: X = \begin{pmatrix} -4 \\ 5 \\ -3 \end{pmatrix} + t \cdot \begin{pmatrix} 0,3 \\ -0,6 \\ 0,5 \end{pmatrix} - P = (x y 1)</math></p> <p>3. Gleichung:  <math>-3 + 0,5 \cdot t = 1 + 3</math>  <math>0,5 \cdot t = 4 \quad   :0,5</math>  <math>t = 8</math></p> <p><math>\Rightarrow X = \begin{pmatrix} -4 \\ 5 \\ -3 \end{pmatrix} + 8 \cdot \begin{pmatrix} 0,3 \\ -0,6 \\ 0,5 \end{pmatrix} = \begin{pmatrix} -4 \\ 5 \\ -3 \end{pmatrix} + \begin{pmatrix} 2,4 \\ -4,8 \\ 4 \end{pmatrix} = \begin{pmatrix} -1,6 \\ 0,2 \\ 1 \end{pmatrix}</math></p>
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Geraden im  $\mathbb{R}^3$

$\Rightarrow x = -1,6$   
 $y = 0,2$

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Bsp. 10)

<p>a. <math>g: X = \begin{pmatrix} -3 \\ -2 \\ 2 \end{pmatrix} + t \cdot \begin{pmatrix} 4 \\ 4 \\ -1 \end{pmatrix} - P = (11 12 -1,5)</math></p> <p><math>\begin{pmatrix} 11 \\ 12 \\ -1,5 \end{pmatrix} = \begin{pmatrix} -3 \\ -2 \\ 2 \end{pmatrix} + t \cdot \begin{pmatrix} 4 \\ 4 \\ -1 \end{pmatrix}</math></p> <p>I <math>11 = -3 + 4t + 1 + 3</math>    II <math>12 = -2 + 4t</math>    III <math>-1,5 = 2 - t + 2</math></p> <p><math>14 = 4t + 1 \cdot 4</math>    <math>14 = 4t</math>    <math>-3,5 = -1 + 4t</math></p> <p><math>3,5 = t</math>    <math>3,5 = t</math>    <math>3,5 = t</math></p> <p style="text-align: center;"><math>P \in g</math></p>	<p>b. <math>g: X = \begin{pmatrix} -6 \\ 7 \\ 11 \end{pmatrix} + t \cdot \begin{pmatrix} 0,5 \\ 1 \\ -2,5 \end{pmatrix} - P = (-1 17 -13)</math></p> <p><math>\begin{pmatrix} -1 \\ 17 \\ -13 \end{pmatrix} = \begin{pmatrix} -6 \\ 7 \\ 11 \end{pmatrix} + t \cdot \begin{pmatrix} 0,5 \\ 1 \\ -2,5 \end{pmatrix}</math></p> <p>I <math>-1 = -6 + 0,5t</math>    II <math>17 = 7 + t</math>    III <math>-13 = 11 - 2,5t</math></p> <p><math>5 = 0,5t + 1 \cdot 0,5</math>    <math>10 = t</math>    <math>-24 = -2,5t</math></p> <p><math>10 = t</math>    <math>10 = t</math>    <math>9,6 = t</math></p> <p style="text-align: center;"><math>P \notin g</math></p>
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Bsp. 11)

<p>a. <math>g: X = \begin{pmatrix} 2 \\ 1 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ 4 \end{pmatrix} \quad \vec{n} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}</math></p> <p><math>\vec{n} \cdot X = \vec{n} \cdot P</math></p> <p><math>\begin{pmatrix} 4 \\ 2 \end{pmatrix} \cdot X = \begin{pmatrix} 4 \\ 2 \end{pmatrix} \cdot \begin{pmatrix} 2 \\ 1 \end{pmatrix}</math></p> <p><math>4x + 2y = 8 + 2</math></p> <p><math>4x + 2y = 10</math></p>	<p>b. <math>g: X = \begin{pmatrix} -1 \\ -4 \end{pmatrix} + t \cdot \begin{pmatrix} 3 \\ -3 \end{pmatrix} \quad \vec{n} = \begin{pmatrix} 3 \\ 3 \end{pmatrix}</math></p> <p><math>\begin{pmatrix} 3 \\ 3 \end{pmatrix} \cdot X = \begin{pmatrix} 3 \\ 3 \end{pmatrix} \cdot \begin{pmatrix} -1 \\ -4 \end{pmatrix}</math></p> <p><math>3x + 3y = -15</math></p>
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Bsp. 12)

<p>a. <math>A = (-2 1), B = (3 7)</math></p> <p><math>\vec{AB} = \begin{pmatrix} 5 \\ 6 \end{pmatrix} \Rightarrow \vec{n}_{AB} = \begin{pmatrix} 6 \\ -5 \end{pmatrix}</math></p> <p><math>\begin{pmatrix} 6 \\ -5 \end{pmatrix} \cdot X = \begin{pmatrix} 6 \\ -5 \end{pmatrix} \cdot \begin{pmatrix} -2 \\ 1 \end{pmatrix}</math></p> <p><math>6x - 5y = -17</math></p>	<p>b. <math>A = (4 2), B = (-2 -5)</math></p> <p><math>\vec{AB} = \begin{pmatrix} -6 \\ -7 \end{pmatrix} \Rightarrow \vec{n}_{AB} = \begin{pmatrix} -7 \\ 6 \end{pmatrix}</math></p> <p><math>\begin{pmatrix} -7 \\ 6 \end{pmatrix} \cdot X = \begin{pmatrix} -7 \\ 6 \end{pmatrix} \cdot \begin{pmatrix} 4 \\ 2 \end{pmatrix}</math></p> <p><math>-7x + 6y = -16</math></p>
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Bsp. 13)

<p>a. <math>g: X = \begin{pmatrix} 3 \\ -1 \end{pmatrix} + t \cdot \begin{pmatrix} -3 \\ 9 \end{pmatrix}, H = (2 -1)</math></p> <p><math>\vec{n}_h = \text{Richtungsvektor von } g</math></p> <p><math>\Rightarrow \vec{n}_h = \begin{pmatrix} -3 \\ 9 \end{pmatrix}</math></p> <p><math>h: \begin{pmatrix} -3 \\ 9 \end{pmatrix} \cdot X = \begin{pmatrix} -3 \\ 9 \end{pmatrix} \cdot \begin{pmatrix} 2 \\ -1 \end{pmatrix}</math></p> <p><math>-3x + 9y = -15</math></p>	<p>b. <math>g: X = \begin{pmatrix} -2 \\ 2 \end{pmatrix} + t \cdot \begin{pmatrix} 4 \\ 5 \end{pmatrix}, H = (-1 7)</math></p> <p><math>\vec{n}_h = \begin{pmatrix} 4 \\ 5 \end{pmatrix}</math></p> <p><math>h: \begin{pmatrix} 4 \\ 5 \end{pmatrix} \cdot X = \begin{pmatrix} 4 \\ 5 \end{pmatrix} \cdot \begin{pmatrix} -1 \\ 7 \end{pmatrix}</math></p> <p><math>4x + 5y = 31</math></p>
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Bsp. 14)

<p>a. <math>g: X = \begin{pmatrix} 3 \\ -1 \end{pmatrix} + t \cdot \begin{pmatrix} -5 \\ 7 \end{pmatrix}</math></p> <p><math>\vec{RV}_g = \begin{pmatrix} -5 \\ 7 \end{pmatrix}</math></p> <p><math>\vec{n}_g = \begin{pmatrix} 7 \\ 5 \end{pmatrix}</math></p>	<p>b. <math>g: 3x - 5y = 1</math></p> <p><math>\vec{n}_g = \begin{pmatrix} 3 \\ -5 \end{pmatrix}</math></p> <p><math>\vec{RV}_g = \begin{pmatrix} 3 \\ 5 \end{pmatrix}</math></p>
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Bsp. 15)

<p>a. <math>g: 2x + 4y = 10</math></p> <p><math>\hookrightarrow 2x = 10 - 4y \quad   :2</math></p> <p><u><math>x = 5 - 2y</math></u></p> <p><math>y = 1 \Rightarrow x = 3 \quad P_1 = (3 1)</math></p> <p><math>y = 3 \Rightarrow x = -1 \quad P_2 = (-1 3)</math></p> <p><math>y = 10 \Rightarrow x = -15 \quad P_3 = (-15 10)</math></p>	<p>b. <math>g: -3x - y = -4 \quad   +3x</math></p> <p><math>-y = 3x - 4 \quad   \cdot (-1)</math></p> <p><u><math>y = -3x + 4</math></u></p> <p><math>x = 1 \Rightarrow y = 1 \quad P_1 = (1 1)</math></p> <p><math>x = -2 \Rightarrow y = 10 \quad P_2 = (-2 10)</math></p> <p><math>x = 0 \Rightarrow y = 4 \quad P_3 = (0 4)</math></p>
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Bsp. 16)

<p>a. <math>g: 3x - 2y = 10 \quad - P_1 = (2 -2), P_2 = (-1 -3)</math></p> <p><u><math>P_1</math></u>: <math>x = 2, y = -2</math></p> <p><math>3 \cdot 2 - 2 \cdot (-2) = 10</math></p> <p><math>6 + 4 = 10</math></p> <p><math>10 = 10 \checkmark</math></p> <p><math>P_1 \in g</math></p> <p><u><math>P_2</math></u>: <math>3 \cdot (-1) - 2 \cdot (-3) = 10</math></p> <p><math>-3 + 6 = 10</math></p> <p><math>3 \neq 10</math></p> <p><math>P_2 \notin g</math></p>	<p>b. <math>g: -5x + 4y = -1 \quad - P_1 = (1 -1), P_2 = (1 1)</math></p> <p><u><math>P_1</math></u>: <math>-5 + 4 \cdot (-1) = -1</math></p> <p><math>-5 - 4 = -9</math></p> <p><math>-9 \neq -1</math></p> <p><math>P_1 \notin g</math></p> <p><u><math>P_2</math></u>: <math>-5 + 4 = -1</math></p> <p><math>-1 = -1</math></p> <p><math>P_2 \in g</math></p>
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Bsp. 17)

<p>a. <math>g: 5x + y = 15</math></p> <p>① <math>\vec{n}_g = \begin{pmatrix} 5 \\ 1 \end{pmatrix} \Rightarrow \vec{RV}_g = \begin{pmatrix} -1 \\ 5 \end{pmatrix}</math></p> <p>② <math>P \in g: x = 3, y = 0 \quad P = \begin{pmatrix} 3 \\ 0 \end{pmatrix}</math></p> <p><u><math>g: X = \begin{pmatrix} 3 \\ 0 \end{pmatrix} + t \cdot \begin{pmatrix} -1 \\ 5 \end{pmatrix}</math></u></p>	<p>b. <math>g: -2x + 6y = 14</math></p> <p>① <math>\vec{n}_g = \begin{pmatrix} -2 \\ 6 \end{pmatrix} \Rightarrow \vec{RV}_g = \begin{pmatrix} 6 \\ 2 \end{pmatrix}</math></p> <p>② <math>P \in g: x = -1, y = 2 \quad P = (-1 2)</math></p> <p><u><math>g: X = \begin{pmatrix} -1 \\ 2 \end{pmatrix} + t \cdot \begin{pmatrix} 6 \\ 2 \end{pmatrix}</math></u></p>
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Bsp. 18)

<p>a. <math>g: X = \begin{pmatrix} -2 \\ 4 \end{pmatrix} + t \cdot \begin{pmatrix} -1 \\ -1 \end{pmatrix}</math></p> <p><math>\vec{n}_g = \begin{pmatrix} -1 \\ 1 \end{pmatrix}</math></p> <p><math>\Rightarrow \underline{\underline{\begin{pmatrix} -1 \\ 1 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -1 \\ 1 \end{pmatrix} \cdot \begin{pmatrix} -2 \\ 4 \end{pmatrix}}</math></p> <p><math>\underline{\underline{-x + y = 6}}</math></p>	<p>b. <math>g: X = \begin{pmatrix} 9 \\ 2 \end{pmatrix} + t \cdot \begin{pmatrix} -6 \\ 2 \end{pmatrix}</math></p> <p><math>\vec{n}_g = \begin{pmatrix} 2 \\ 6 \end{pmatrix}</math></p> <p><math>\Rightarrow \underline{\underline{\begin{pmatrix} 2 \\ 6 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ 6 \end{pmatrix} \cdot \begin{pmatrix} 9 \\ 2 \end{pmatrix}}</math></p> <p><math>\underline{\underline{2x + 6y = 30}}</math></p>
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Bsp. 19)

<p>a. <math>g: y = -2x + 7</math></p> <p>① <math>k = -2 \Rightarrow \vec{r}_{V_g} = \begin{pmatrix} -1 \\ -2 \end{pmatrix}</math></p> <p>② <math>P_{eg} = \begin{pmatrix} 0 \\ 7 \end{pmatrix}</math></p> <p><math>\underline{\underline{g: X = \begin{pmatrix} 0 \\ 7 \end{pmatrix} + t \cdot \begin{pmatrix} -1 \\ -2 \end{pmatrix}}}</math></p>	<p>b. <math>g: y = 7x + 12</math></p> <p>① <math>\vec{r}_{V_g} = \begin{pmatrix} 1 \\ 7 \end{pmatrix}</math></p> <p>② <math>P_{eg} = \begin{pmatrix} 0 \\ 12 \end{pmatrix}</math></p> <p><math>\underline{\underline{g: X = \begin{pmatrix} 0 \\ 12 \end{pmatrix} + t \cdot \begin{pmatrix} 1 \\ 7 \end{pmatrix}}}</math></p>
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Bsp. 20)

<p>a. <math>g: A = (-7 9), B = (-5 5)</math></p> <p>① <math>\vec{AB} = \begin{pmatrix} 2 \\ -4 \end{pmatrix} \parallel \begin{pmatrix} -1 \\ 2 \end{pmatrix}</math></p> <p><math>\underline{\underline{g: X = \begin{pmatrix} -7 \\ 9 \end{pmatrix} + t \cdot \begin{pmatrix} -1 \\ 2 \end{pmatrix}}}</math></p> <p>② <math>\vec{n}_g = \begin{pmatrix} 2 \\ 1 \end{pmatrix}</math></p> <p><math>\underline{\underline{\begin{pmatrix} 2 \\ 1 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} \cdot \begin{pmatrix} -7 \\ 9 \end{pmatrix}}}</math></p> <p>③ <math>\underline{\underline{2x + y = -5}}</math></p> <p>④ <math>\underline{\underline{y = -2x - 5}}</math></p>	<p>b. <math>g: A = (3 1), B = (10 -6)</math></p> <p>① <math>\vec{AB} = \begin{pmatrix} 7 \\ -7 \end{pmatrix} \parallel \begin{pmatrix} 1 \\ -1 \end{pmatrix}</math></p> <p><math>\underline{\underline{g: X = \begin{pmatrix} 3 \\ 1 \end{pmatrix} + t \cdot \begin{pmatrix} 1 \\ -1 \end{pmatrix}}}</math></p> <p>② <math>\vec{n}_g = \begin{pmatrix} 1 \\ 1 \end{pmatrix}</math></p> <p><math>\underline{\underline{\begin{pmatrix} 1 \\ 1 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \cdot \begin{pmatrix} 3 \\ 1 \end{pmatrix}}}</math></p> <p>③ <math>\underline{\underline{x + y = 4}}</math></p> <p>④ <math>\underline{\underline{y = -x + 4}}</math></p>
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Bsp. 21)

<p>a. <math>g: X = \begin{pmatrix} 2 \\ -4 \\ 2 \end{pmatrix} + t \cdot \begin{pmatrix} 4 \\ 1 \\ -1 \end{pmatrix} - P = (1 2 3)</math></p> <p><math>P: X = \begin{pmatrix} 1 \\ 3 \\ 1 \end{pmatrix} + u \cdot \begin{pmatrix} 4 \\ 1 \\ -1 \end{pmatrix}</math></p> <p>NVzug: <math>\begin{pmatrix} 1 \\ -4 \\ 0 \end{pmatrix}</math>, da <math>\begin{pmatrix} 1 \\ -4 \\ 0 \end{pmatrix} \cdot \begin{pmatrix} 4 \\ 1 \\ -1 \end{pmatrix} = 4 - 4 = 0 \checkmark</math></p> <p><math>\Rightarrow N: X = \begin{pmatrix} 1 \\ 3 \\ 1 \end{pmatrix} + v \cdot \begin{pmatrix} 1 \\ -4 \\ 0 \end{pmatrix}</math></p>	<p>b. <math>g: X = \begin{pmatrix} -3 \\ -6 \\ -1 \end{pmatrix} + t \cdot \begin{pmatrix} -2 \\ 3 \\ -6 \end{pmatrix} - P = (4 7 1)</math></p> <p><math>P: X = \begin{pmatrix} 4 \\ 7 \\ 1 \end{pmatrix} + u \cdot \begin{pmatrix} -2 \\ 3 \\ -6 \end{pmatrix}</math></p> <p>NVzug: <math>\begin{pmatrix} 3 \\ -4 \\ -3 \end{pmatrix}</math>, da <math>\begin{pmatrix} 3 \\ -4 \\ -3 \end{pmatrix} \cdot \begin{pmatrix} -2 \\ 3 \\ -6 \end{pmatrix} = -6 - 12 + 18 = 0 \checkmark</math></p> <p><math>\Rightarrow N: X = \begin{pmatrix} 4 \\ 7 \\ 1 \end{pmatrix} + s \cdot \begin{pmatrix} 3 \\ -4 \\ -3 \end{pmatrix}</math></p>
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Bsp. 22)

a)  $t_1 = 0: X(0) = \begin{pmatrix} 0 \\ 7000 \\ 0 \end{pmatrix}$      $t_2 = 10: X(10) = \begin{pmatrix} 0 \\ 7000 \\ 0 \end{pmatrix} + \begin{pmatrix} 2000 \\ 1000 \\ -2000 \end{pmatrix} = \begin{pmatrix} 2000 \\ 1000 \\ 5000 \end{pmatrix}$

$t_3 = 30: X(30) = \begin{pmatrix} 6000 \\ 3000 \\ 1000 \end{pmatrix}$

b)  $\left| \begin{pmatrix} 200 \\ 100 \\ -200 \end{pmatrix} \right| = \sqrt{200^2 + 100^2 + (-200)^2} = 300 \frac{m}{s} = 1080 \frac{km}{h}$

c) III  $7000 - 200t = 0 \quad | +200t$      $X(35) = \begin{pmatrix} 7000 \\ 3500 \\ 0 \end{pmatrix}$   
 $7000 = 200t \quad | :200$   
 $T = 35 \text{ sek}$  ← LAMPUNG

Bsp. 23)

a)  $t_1 = 0: X(0) = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$ ,  $t_2 = 15: X(15) = \begin{pmatrix} 1200 \\ 1650 \\ 1500 \end{pmatrix}$ ,  $X(50) = \begin{pmatrix} 4000 \\ 3500 \\ 5000 \end{pmatrix}$

b)  $\left| \begin{pmatrix} 80 \\ 70 \\ 100 \end{pmatrix} \right| = \sqrt{80^2 + 70^2 + 100^2} \approx 145,95 \frac{m}{s} \approx 524,4 \frac{km}{h}$

c) III:  $100t = 7000 \quad | :100$   
 $T = 70 \text{ sek}$   
 nach 70 Sekunden!