Musterlösungen zu AnGeo 7

Aufgabe 2b) gesucht $P(x_p | y_p)$, wobei gilt:

$$P \in h \Rightarrow x_p + y_p = 1 \Leftrightarrow y_p = 1 - x_p$$

$$\Downarrow$$

$$P(x_p | 1 - x_p)$$

$$\Rightarrow 3 \overset{!}{=} \delta(P; g)$$

$$\Leftrightarrow 3 = \frac{|3 \cdot x_p - 4 \cdot y_p - 6|}{\sqrt{3^2 + 4^2}}$$

$$\Leftrightarrow 3 = \frac{|3 \cdot x_p - 4 \cdot (1 - x_p) - 6|}{\sqrt{25}} = \frac{|3x_p - 4 + 4x_p - 6|}{5}$$

$$\Leftrightarrow 3 = \frac{|7x_p - 10|}{5} = \pm \frac{7x_p - 10}{5}$$

$\oplus$

$$3 = \frac{7x_p - 10}{5} \quad | \cdot 5$$

$$15 = 7x_p - 10$$

$$25 = 7x_p$$

$$x_p = \frac{25}{7} \Rightarrow y_p = 1 - \frac{25}{7} = -\frac{18}{7}$$

$$\Rightarrow P_1\left(\frac{25}{4} \middle| -\frac{18}{7}\right)$$

$\ominus$

$$3 = -\frac{7x_p - 10}{5} \quad | \cdot 5$$

$$15 = -(7x_p - 10) = -7x_p + 10$$

$$7x_p = -5 \Leftrightarrow x_p = -\frac{5}{7}$$

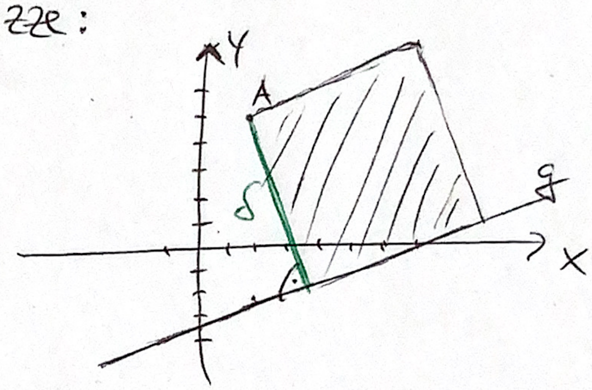
$$\Rightarrow y_p = 1 + \frac{5}{7} = \frac{12}{7}$$

$$\Rightarrow P_2\left(-\frac{5}{7} \middle| \frac{12}{7}\right)$$

Aufgabe 3)

$g: y = \frac{1}{2}x - \frac{7}{2} \Leftrightarrow x - 2y - 7 = 0$

$A(2|5) \notin g$; Skizze:



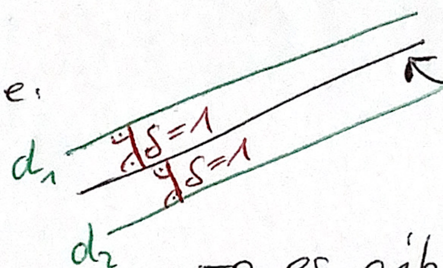
$\Rightarrow F_{\square} = \delta^2$

$\Rightarrow \delta(A; g) = \frac{|2 - 2\cdot 5 - 7|}{\sqrt{1^2 + (-2)^2}}$

$= \frac{|-15|}{\sqrt{5}} = \frac{15}{\sqrt{5}} = 3\sqrt{5} \Rightarrow F_{\square} = (3\sqrt{5})^2 = \underline{\underline{45}}$

Aufgabe 4)

Skizze:



$\leftarrow g: 4x - 3y - 8 = 0$

$\Rightarrow$ es gibt 2 solche Geraden:

$d_{1,2}: 4x - 3y + c = 0$

$\Rightarrow 1 = \delta(P; d)$ wobei P ein beliebiger Punkt auf der Gerade g ist, z.B. $P(2|0)$

$\Rightarrow 1 = \frac{|4\cdot 2 - 3\cdot 0 + c|}{\sqrt{4^2 + 3^2}} = \frac{|8 + c|}{\sqrt{25}}$

$\Leftrightarrow 1 = \pm \frac{8 + c}{5}$

$\oplus$

$1 = \frac{8+c}{5}$

$5 = 8 + c$

$c = -3$

$\Rightarrow \boxed{d_1: 4x - 3y - 3 = 0}$

$\ominus$

$1 = -\frac{8+c}{5}$

$5 = -(8 + c) = -8 - c$

$c = -13$

$\Rightarrow \boxed{d_2: 4x - 3y - 13 = 0}$