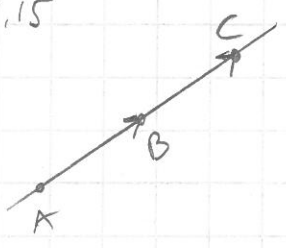


$$\Rightarrow \begin{cases} 1 = 2x - 7y \\ 7 = 3x + 6y \end{cases} \Rightarrow x = \frac{5}{3}, y = \frac{1}{3}$$

$$\underline{\underline{C = x\vec{i} + y\vec{j} = \frac{5}{3}(2\vec{i} + 3\vec{j}) + \frac{1}{3}(-7\vec{i} + 6\vec{j})}}$$

8.15



$A = (1, 1, 1), B = (-1, 1, 3), P = (4, 1, -2), Q = (0, 2, 4)$
 Piste C on suoralle

$$\Leftrightarrow \vec{AC} \parallel \vec{AB} \Leftrightarrow \vec{AC} = t\vec{AB} = t(-2\vec{i} + 2\vec{j}) = -2t\vec{i} + 2t\vec{j}$$

$$\Rightarrow C = (1 - 2t, 1, 1 + 2t)$$

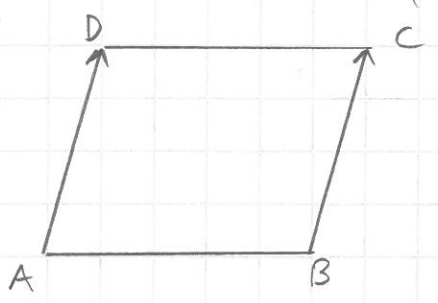
$P = (4, 1, -2)$ on suoralle $\Leftrightarrow \begin{cases} 4 = 1 - 2t \Leftrightarrow t = -\frac{3}{2} \\ 1 = 1 \\ -2 = 1 + 2t \Leftrightarrow t = -\frac{3}{2} \end{cases} \%$

Γ Sillä $\vec{AP} = -\frac{3}{2}\vec{AB}$ \Rightarrow yhtälöryhmällä on ratk. \Rightarrow P on suoralla

$Q = (0, 2, 4)$

$\neq 1 \Rightarrow Q$ ei ole suoralla

8.18

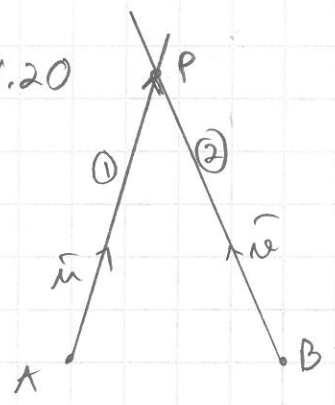


$A = (3, 2, -1), B = (4, 1, 6), C = (7, -2, 3)$
 ABCD suunnikas

$$\vec{AD} = \vec{BC} = (7-4)\vec{i} + (-2-1)\vec{j} + (3-6)\vec{k} = 3\vec{i} - 3\vec{j} - 3\vec{k}$$

$$\Rightarrow D = (3+3, 2-3, -1-3) = (6, -1, -4)$$

8.20



$A = (1, -2, 3), \vec{\mu} = 2\vec{i} - \vec{j} - 3\vec{k}$
 $B = (9, -1, -12), \vec{\nu} = -\vec{i} - 2\vec{j} + 3\vec{k}$

1° P on osittellisesti 1 $\Leftrightarrow \vec{AP} \parallel \vec{\mu}$
 $\Leftrightarrow \vec{AP} = t\vec{\mu} = 2t\vec{i} - t\vec{j} - 3t\vec{k}, t \geq 0$
 $\Rightarrow P = (1+2t, -2-t, 3-3t)$

2° P on osittellisesti 2 $\Leftrightarrow \vec{BP} \parallel \vec{\nu}$
 $\Leftrightarrow \vec{BP} = s\vec{\nu} = -s\vec{i} - 2s\vec{j} + 3s\vec{k}, s \geq 0$
 $\Rightarrow P = (9-s, -1-2s, -12+3s)$

1° ja 2° Säteet b. k. sovellet

$$\Leftrightarrow \begin{cases} 1+2t = 9-s & (1) \\ -2-t = -1-2s & (2) \\ 3-3t = -12+3s & (3) \end{cases}$$

(1) ja (2) $\Rightarrow t = 3, s = 2, t, s \geq 0 \%$

Tark. (3): sen: $3 - 3 \cdot 3 = -12 + 3 \cdot 2 \%$

\Rightarrow yhtälöryhmällä on ratk. \Rightarrow säteet b. k. sovellet