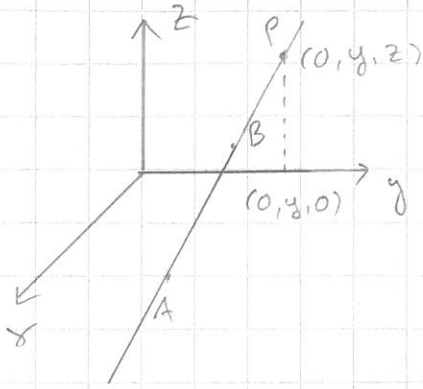


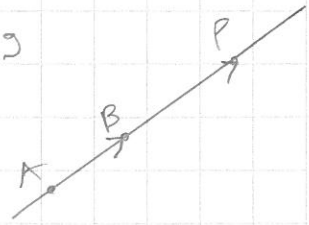
a) P on y-akselin yhtälöllä
$\Leftrightarrow$ P on yz-tasolla $\Rightarrow x = 5-3t = 0$
$\Leftrightarrow t = \frac{5}{3}$

$\Rightarrow P = (5-3\cdot\frac{5}{3},\ 5-2\cdot\frac{5}{3},\ 0+6\cdot\frac{5}{3})$
$= (0, \frac{5}{3}, 10)$ $\Rightarrow$ korkeus: 10

b) P on x-akselin suuntainen $(x,0,0)$ yhtälöllä $\Rightarrow P = (x,0,z)$
$\Rightarrow y = 5-2t = 0 \Leftrightarrow t = \frac{5}{2}$

$\Rightarrow P = (5-3\cdot\frac{5}{2},\ 5-2\cdot\frac{5}{2},\ 0+6\cdot\frac{5}{2}) = (-\frac{5}{2}, 0, 15)$ $\Rightarrow$ korkeus: 15

6.9

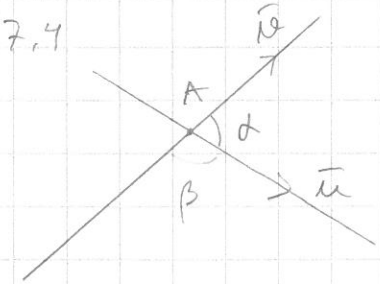


$A = (-7, 13, -9)$, $B = (-5, -8, 9)$, $P = (1, -1, 3)$

$\vec{AB} = 12\vec{i} - 21\vec{j} + 18\vec{k}$
$\vec{AP} = 8\vec{i} - 14\vec{j} + 12\vec{k}$
$\Rightarrow \vec{AB} = \frac{3}{2}\vec{AP}$
$\Rightarrow \vec{AB} \parallel \vec{AP}$ $\Rightarrow$ P on suoralla

7. Suorien leikkaaminen

7.4



$A = (5, -4, 0)$, $\vec{u} = \vec{i} - \vec{j} + 2\vec{k}$, $\vec{v} = 3\vec{i} + 2\vec{j} - \vec{k}$

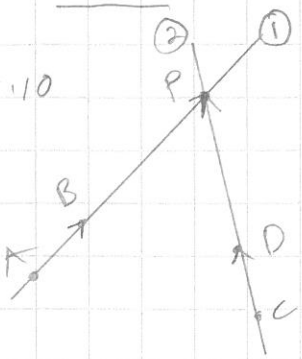
$\vec{u}\cdot\vec{v} = |\vec{u}||\vec{v}|\cos\angle(\vec{u},\vec{v})$

$\Leftrightarrow \cos\angle(\vec{u},\vec{v}) = \frac{\vec{u}\cdot\vec{v}}{|\vec{u}||\vec{v}|} = \frac{1\cdot 3 + (-1)\cdot 2 + 2\cdot(-1)}{\sqrt{1^2+(-1)^2+2^2}\cdot\sqrt{3^2+2^2+(-1)^2}}$

$= \frac{-1}{\sqrt{6}\sqrt{14}}$ $\Rightarrow \sphericalangle(\vec{u},\vec{v}) = \alpha \approx 96,26°$

Suorien välinen kulma $\leq 90°$ $\Rightarrow \beta = 180° - \alpha \approx 83,74° \approx 84°$

7.10



$A = (2, -1, 8)$, $B = (5, -1, -7)$
$C = (0, -13, 3)$, $D = (2, -5, 3)$

1° P on suoralla 1 $\Leftrightarrow \vec{AP} \parallel \vec{AB} \Leftrightarrow \vec{AP} = t\vec{AB} = t(3\vec{i} - 15\vec{k})$
$= 3t\vec{i} - 15t\vec{k}$

$\Rightarrow P = (2+3t, -1, 8-15t)$

2° P on suoralla 2 $\Leftrightarrow \vec{CP} \parallel \vec{CD} \Leftrightarrow \vec{CP} = s\vec{CD} = s(2\vec{i} + 8\vec{j}) = 2s\vec{i} + 8s\vec{j}$

$\Rightarrow P = (0+2s, -13+8s, 3)$