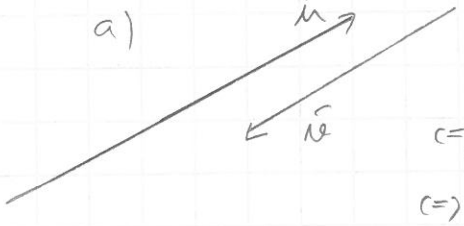
2.10 $\bar{u} = -11t\bar{i} - 9\bar{j} + 6t\bar{k}$

$\bar{v} = (t+2)\bar{i} + 3\bar{j} - 2t\bar{k}$

a)



$\bar{u} \parallel \bar{v} \iff \bar{u} = s\bar{v}$, $s \in \mathbb{R}$

$\iff -11t\bar{i} - 9\bar{j} + 6t\bar{k} = s((t+2)\bar{i} + 3\bar{j} - 2t\bar{k})$

$\iff -11t\bar{i} - 9\bar{j} + 6t\bar{k} = s(t+2)\bar{i} + 3s\bar{j} - 2ts\bar{k}$

$\Rightarrow \begin{cases} -11t = s(t+2) & (1) \\ -9 = 3s & (2) \\ 6t = -2ts & (3) \end{cases}$

3 yhtälöä, 2 tuntematonta → jätetään alempi yhtälö (3) pois

$\Rightarrow \begin{cases} -11t = s(t+2) \\ -9 = 3s \end{cases}$ $\iff s = -3$

$\Rightarrow -11t = -3(t+2)$

$\iff -11t = -3t - 6$

$\iff 6 = 8t \iff t = \frac{6}{8} = \frac{3}{4}$

Tark. (3): $6 \cdot \frac{3}{4} = -2 \cdot \frac{3}{4} \cdot (-3) \iff \frac{9}{2} = \frac{9}{2}$ ✓.

Siis $t = \frac{3}{4}$

b) $\bar{u} \uparrow\downarrow \bar{v} \iff \bar{u} = s\bar{v}$, $s < 0$

a)-kohta: $s = -3$, $t = \frac{3}{4}$

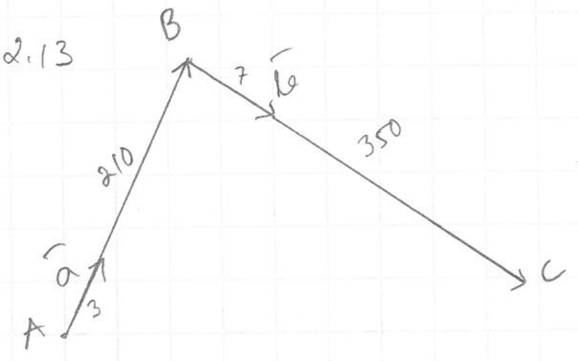
$s < 0$ ✓. Siis $t = \frac{3}{4}$

c) $\bar{u} \uparrow\uparrow \bar{v} \iff \bar{u} = s\bar{v}$, $s > 0$

a)-kohta: $s = -3$, $t = \frac{3}{4}$

$s < 0$ ↯ Siis ei ratk.

2.13



$A = (2, 3, 0)$, $\bar{a} = 2\bar{i} - 2\bar{j} + \bar{k}$, $\bar{b} = -3\bar{i} + 6\bar{j} + 2\bar{k}$

$|\bar{a}| = \sqrt{2^2 + (-2)^2 + 1^2} = \sqrt{9} = 3$

$\overline{AB} = \frac{210}{3}\bar{a} = 70\bar{a}$

$|\bar{b}| = \sqrt{(-3)^2 + 6^2 + 2^2} = \sqrt{49} = 7$

$\overline{BC} = \frac{350}{7}\bar{b} = 50\bar{b}$

$\overline{AC} = \overline{AB} + \overline{BC} = 70\bar{a} + 50\bar{b} = -10\bar{i} + 160\bar{j} + 170\bar{k}$

$\Rightarrow C = (2 - 10, 3 + 160, 0 + 170) = (-8, 163, 170)$