# Rešitve nalog: Vektorji v $\mathbb{R}^3$

## 1 Linearne kombinacije

1.1. $\overrightarrow{AC} = \vec{x}+\vec{y}$, $\overrightarrow{AD} = 2\vec{y}$, $\overrightarrow{BE} = 2\vec{y}-2\vec{x}$, $\overrightarrow{AE} = 2\vec{y}-\vec{x}$, $\overrightarrow{BF} = \vec{y}-2\vec{x}$, $\overrightarrow{DF} = -\vec{x}-\vec{y}$

1.2. $1:1$

1.3.

1.4. $3:4$

1.5. Vzporedne so, če je $AP : PB = DS : SA$.

1.6. $\overrightarrow{BX} = \frac{2}{3}\overrightarrow{BC} + \frac{1}{3}\overrightarrow{CD}$ in $\overrightarrow{YD} = \frac{1}{3}\overrightarrow{BA} + \frac{2}{3}\overrightarrow{AD}$

1.7. $1:1$

1.8. $C(-6, 4, 3)$

1.9. $12:7$

## 2 Skalarni produkt

2.1. (a) $\arccos\frac{4}{9}$ (b) $(2,2,1)+(1,-2,2)$

2.2. $\frac{\pi}{3}$

2.3. $\pi - \arccos\frac{1}{\sqrt{10}}$

2.4. $-55$

2.5. Dolžine stranic so $\left|\overrightarrow{AB}\right| = \sqrt{11}$, $\left|\overrightarrow{AC}\right| = \sqrt{11}$ in $\left|\overrightarrow{BC}\right| = 2\sqrt{3}$, koti pa $\alpha = \arccos\frac{5}{11}$, $\beta = \gamma = \arccos\frac{\sqrt{33}}{11}$.

2.6. $\left(\frac{5}{4}, -1, \frac{7}{4}\right)$

2.7.

2.8.

2.9.

2.10.

2.11.

2.12. Premica $t(1,-1,0)$, $t \in \mathbb{R}$.

2.13. $(0,1,2)$

# 3 Vektorski produkt

3.1.

3.2. $(1,2,3)$

3.3. $(9,9,9)$, $(-5,-7,-13)$, $(-7,13,-5)$ in $(11,-11,1)$

3.4.

3.5.
- Če $\vec{a}=0$: $\vec{x} \in \mathbb{R}^3$.
- Če $\vec{a} \not\perp \vec{b}$: $\vec{x}=0$.
- Če $\vec{a} \neq 0$ in $\vec{a} \perp \vec{b}$: $\vec{x}=\alpha\left(\vec{a}-\vec{a}\times\vec{b}\right)$, $\alpha \in \mathbb{R}$.

3.6. $|\vec{r}\times\vec{e}|=a$

# 4 Mešani produkt

4.1. (a) Da, $(8,2,-14)=2(3,1,-5)-(-2,0,4)$.
(b) Ne.
(c) Za $x=-2$. V tem primeru je $(x,-3,-5)=-8(1,0,-2)-3(-2,1,7)$.

4.2. (a) $o=8$, $S=2\sqrt{2}$ (b) $\left(1,\frac{25}{8},-\frac{1}{8}\right)$ (c) $\left(1,\frac{7}{2},-\frac{1}{2}\right)$

4.3. $\left(\frac{2}{3},\frac{5}{3},-\frac{1}{3}\right)$

4.4.

4.5. 54

4.6. $\vec{b_1}=\frac{1}{[\vec{a_1},\vec{a_2},\vec{a_3}]}\vec{a_2}\times\vec{a_3}$, $\vec{b_2}=\frac{1}{[\vec{a_1},\vec{a_2},\vec{a_3}]}\vec{a_3}\times\vec{a_1}$, $\vec{b_3}=\frac{1}{[\vec{a_1},\vec{a_2},\vec{a_3}]}\vec{a_1}\times\vec{a_2}$, $\left[\vec{b_1},\vec{b_2},\vec{b_3}\right]=\frac{1}{[\vec{a_1},\vec{a_2},\vec{a_3}]}$