Univerza na Primorskem
UP FAMNIT
Študijsko leto 2017/2018

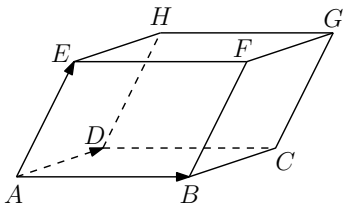
Algebra I

1. KOLOKVIJ

– 24. NOVEMBER 2017 –

Čas pisanja: 90 *minut. Maksimalno število točk:* 50. *Dovoljena je uporaba pisala in enega ročno napisanega lista formata A*4 *z definicijami in formulami (brez rešenih primerov). Pišite razločno in utemeljite vsak odgovor. Srečno!*

1. Naj bo paralelepiped $ABCDEFGH$ določen s točko $A(1,0,0)$ in vektoji $\vec{AB} = (1,0,0)$, $\vec{AD} = (2,-1,0)$ ter $\vec{AE} = (0,2,1)$.



   (a) Določite kookrdinate točk B, C, D in G. *(4 točke)*

   (b) Izračunajte kot med vektorjema $\vec{AB}$ in $\vec{AE}$. *(3 točke)*

   (c) Izračunajte prostornino paralelepipeda. *(5 točk)*

2. Dani sta točki $A(1,2,-1)$ in $B(7,2,2)$.

   (a) Poiščite koordinate točke T na daljici AB, tako da bo $|AT| : |TB| = 1 : 3$. *(5 točk)*

   (b) Izračunajte dolžino daljice AB. *(3 točke)*

3. Naj bo Π ravnina podana z enačbo $x - y + 2z = 0$.

   (a) Poiščite premico p, ki poteka skozi točko $T(4,0,4)$ in je pravokotna na ravnino Π. *(5 točk)*

   (b) Določite koordinate točke, v kateri premica p prebada ravnino Π. *(3 točke)*

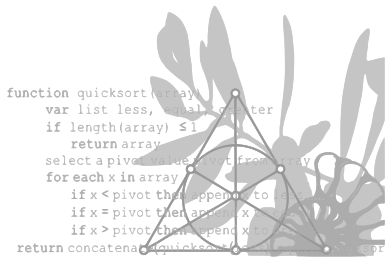
   (c) Določite koordinate točke A, ki leži na premici p in je enako oddaljena od točke T in ravnine Π. Kolikšna je ta razdalja? *(6 točk)*

4. Dani sta premica p z $\frac{x+2}{5} = -\frac{y}{2} = \frac{z-2}{5}$ in ravnina Σ z $3x + 5y - 1z = 4$.

   (a) Izračunajte razdaljo med premico p in premico $\frac{x+1}{2} = \frac{y-1}{3} = z$. *(5 točk)*

   (b) Izračunajte razdaljo med premico p in ravnino Σ. *(5 točk)*

   (c) Poiščite premico, ki je zrcalna premici p glede na ravnino Σ. *(6 točk)*



University of Primorska
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Accademic year 2017/2018

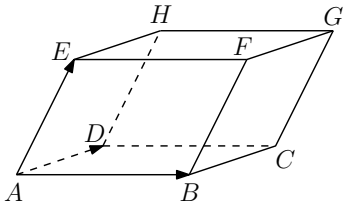
Algebra I

Midterm 1

– November 24, 2017 –

Time: 90 minutes. Maximum number of points: 50. You are allowed to use a pen and one A4 hand-written piece of paper with definitions and formulas (and with no solved exercises). Write clearly, and justify all your answers. Good luck!

1. Let $ABCDEFGH$ be the parallelepiped defined by the point $A(1,0,0)$ and the vectors $\vec{AB} = (1,0,0)$, $\vec{AD} = (2,-1,0)$ and $\vec{AE} = (0,2,1)$.



   (a) Find the coordinates of points B, C, D and G. *(4 points)*

   (b) Compute the angle between the vectors $\vec{AB}$ and $\vec{AE}$. *(3 points)*

   (c) Compute the volume of the parallelepiped. *(5 points)*

2. Consider the points $A(1,2,-1)$ and $B(7,2,2)$.

   (a) Find the coordinates of the point T on the line segment AB such that $|AT| : |TB| = 1 : 3$. *(5 points)*

   (b) Compute the length of the line segment AB. *(3 points)*

3. Let Π be the plane defined by $x - y + 2z = 0$.

   (a) Find the line p, that contains point $T(4,0,4)$ and is perpendicular to the plane Π. *(5 points)*

   (b) Find the coordinates of the intersection of the line p and the plane Π. *(3 points)*

   (c) Determine the coordinates of the point A, that lies on the line p and is equidistant from T and Π. Also, determine this distance. *(6 points)*

4. Let p be the line given by $\frac{x+2}{5} = -\frac{y}{2} = \frac{z-2}{5}$ and Σ the plane given by $3x + 5y - 1z = 4$.

   (a) Compute the distance between p and the line $\frac{x+1}{2} = \frac{y-1}{3} = z$. *(5 points)*

   (b) Compute the distance between p and Σ. *(5 points)*

   (c) Find the line that is symmetric to p with respect to Σ. *(6 points)*