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In[1]:= parametarskaJednacinaPrave[{x0_, y0_, z0_}, {p1_, p2_, p3_}] :=
        {p1 * t + x0, p2 * t + y0, p3 * t + z0}

In[2]:= parametarskaJednacinaPraveIspis[{x_, y_, z_}] :=
        Print["x = ", x, "\ny = ", y, "\nz = ", z]

In[3]:= implicitnaJednacinaRavniIspis[{x0_, y0_, z0_}, {a_, b_, c_}] :=
        TraditionalForm[a * x + b * y + c * z - (a * x0 + b * y0 + c * z0) == 0]

In[4]:= parametarskaJednacinaRavni[{x0_, y0_, z0_}, {ux_, uy_, uz_}, {vx_, vy_, vz_}] :=
        {x0 + ux * t + vx * s, y0 + uy * t + vy * s, z0 + uz * t + vz * s}

In[5]:= parametarskaJednacinaRavniIspis[{x_, y_, z_}] :=
        Print["x = ", x, "\ny = ", y, "\nz = ", z]

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11.

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In[6]:= tA = {1, 2, 3};

In[7]:= tB = {-1, 2, -1};

In[8]:= tC = {0, 0, 1};

In[9]:= AB = tB - tA
Out[9]= {-2, 0, -4}

In[10]:= AC = tC - tA
Out[10]= {-1, -2, -2}

In[11]:= jna = parametarskaJednacinaRavni[tA, AB, AC];

In[12]:= parametarskaJednacinaRavniIspis[jna]
        x = 1 - s - 2 t
        y = 2 - 2 s
        z = 3 - 2 s - 4 t

In[13]:= nα = Cross[AB, AC]
Out[13]= {-8, 0, 4}

In[14]:= implicitnaJednacinaRavniIspis[tC, nα]

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Out[14]//TraditionalForm=
        -8 x + 4 z - 4 = 0

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14.

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In[15]:= vp = {1, 5, 1};

In[16]:= tP = {2, 11, 2};

In[17]:= nβ = {0, 1, 0};

In[18]:= nα = Cross[vp, nβ]
Out[18]= {-1, 0, 1}

In[19]:= implicitnaJednacinaRavniIspis[tP, nα]

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Out[19]//TraditionalForm=
        z - x = 0

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15.

In[20]:=  $\mathbf{n}\alpha = \{1, -1, 0\};$

In[21]:=  $\mathbf{n}\beta = \{-2, 0, 1\};$

In[22]:=  $\mathbf{vp} = \text{Cross}[\mathbf{n}\beta, \mathbf{n}\alpha]$

Out[22]=  $\{1, 1, 2\}$

In[23]:=  $\text{Reduce}[x - y - 1 == 0 \ \&\& \ z - 2x == 0, \{x, y, z\}]$

Out[23]=  $y == -1 + x \ \&\& \ z == 2x$

In[24]:=  $\% /. \{x \rightarrow 0\}$

Out[24]=  $y == -1 \ \&\& \ z == 0$

In[25]:=  $\mathbf{tP} = \{0, -1, 0\};$

In[26]:=  $\mathbf{p} = \text{parametarskaJednacinaPrave}[\mathbf{tP}, \mathbf{vp}];$

In[27]:=  $\text{parametarskaJednacinaPraveIspis}[\mathbf{p}];$

$x = t$

$y = -1 + t$

$z = 2t$

16.a)

In[28]:=  $\mathbf{tM} = \{1, 0, 12\};$

In[29]:=  $\mathbf{vp} = \{1, 1, 2\};$

In[30]:=  $\mathbf{tP} = \{0, -1, 0\};$

In[31]:=  $\mathbf{PM} = \mathbf{tM} - \mathbf{tP}$

Out[31]=  $\{1, 1, 12\}$

In[32]:=  $\mathbf{d} = \frac{\text{Norm}[\text{Cross}[\mathbf{PM}, \mathbf{vp}]]}{\text{Norm}[\mathbf{vp}]}$

Out[32]=  $\frac{10}{\sqrt{3}}$

16. b)

In[33]:=  $\mathbf{n}\alpha = \{1, -1, -4\};$

In[34]:=  $\mathbf{f}[\{x\_ , y\_ , z\_ \}] := x - y - 4z$

In[35]:=  $\mathbf{d} = \frac{\text{Abs}[\mathbf{f}[\mathbf{tM}]]}{\text{Norm}[\mathbf{n}\alpha]}$

Out[35]=  $\frac{47}{3\sqrt{2}}$

17.

In[36]:=  $\mathbf{f}[\{x\_ , y\_ , z\_ \}] := x - 2y + 5z - 1$

In[37]:=  $\mathbf{n}\alpha = \{1, -2, 5\};$

a)

In[38]:=  $\mathbf{vp} = \{3, 7, 1\};$

In[39]:= **tP = {2, 4, 0};**

In[40]:= **vp.nα**

Out[40]= -6

In[41]:= **pt = -  $\frac{f[tP]}{vp.n\alpha}$**

Out[41]=  $-\frac{7}{6}$

In[42]:= **p = parametarskaJednacinaPrave[tP, vp]**

Out[42]= {2 + 3 t, 4 + 7 t, t}

In[43]:= **parametarskaJednacinaPraveIspis[p]**

x = 2 + 3 t

y = 4 + 7 t

z = t

In[44]:= **tA = p /. {t → pt}**

Out[44]=  $\left\{-\frac{3}{2}, -\frac{25}{6}, -\frac{7}{6}\right\}$

$p \cap \alpha = \{tA\}$

b)

In[45]:= **vq = {3, -1, -1};**

In[46]:= **tQ = {0, 2, 1};**

In[47]:= **vq.nα**

Out[47]= 0

In[48]:= **f[tQ]**

Out[48]= 0

$n\alpha.vq = 0$  pa  $q \parallel \alpha$  ili  $q \in \alpha$ , a kako  $f[Q] = 0$ , to  $q$  bas pripada  $\alpha$ .  $\rightarrow q \cap \alpha = q$

c)

In[49]:= **vr = {3, -1, -1};**

In[50]:= **tR = {1, 2, 3};**

In[51]:= **vr.nα**

Out[51]= 0

In[52]:= **f[tR]**

Out[52]= 11

$n\alpha.vr = 0$  pa  $r \parallel \alpha$  ili  $r \in \alpha$ , a kako  $f[R]$  nije 0 tj.  $R \notin \alpha$ , to je  $r \parallel \alpha$ .  $\rightarrow r \cap \alpha = \emptyset$

d)

prvi način:

In[53]:= **Solve**[ $x - y - 1 == 0 \ \&\& \ x + y - z + 5 == 0 \ \&\& \ x - 2y + 5z - 1 == 0$ , { $x, y, z$ }]

Out[53]=  $\left\{ \left\{ x \rightarrow -\frac{7}{3}, y \rightarrow -\frac{10}{3}, z \rightarrow -\frac{2}{3} \right\} \right\}$

drugi način:

In[55]:= **nβ** = {1, -1, 0};

In[56]:= **nγ** = {1, 1, -1};

In[57]:= **vs** = **Cross**[**nβ**, **nγ**]

Out[57]= {1, 1, 2}

In[58]:= **Reduce**[ $x - y - 1 == 0 \ \&\& \ x + y - z + 5 == 0$ , { $x, y, z$ }]

Out[58]=  $y == -1 + x \ \&\& \ z == 4 + 2x$

In[59]:= % /. { $x \rightarrow 0$ }

Out[59]=  $y == -1 \ \&\& \ z == 4$

In[60]:= **tS** = {0, -1, 4};

In[61]:= **vs.nα**

Out[61]= 9

In[62]:= **s** =  $-\frac{f[tS]}{vs.n\alpha}$

Out[62]=  $-\frac{7}{3}$

In[63]:= **parametarskaJednacinaPrave**[**tS**, **vs**]

Out[63]= { $t$ ,  $-1 + t$ ,  $4 + 2t$ }

In[64]:= **tA** = % /. { $t \rightarrow s$ }

Out[64]=  $\left\{ -\frac{7}{3}, -\frac{10}{3}, -\frac{2}{3} \right\}$

$$s \cap \alpha = \left\{ \left( -\frac{7}{3}, -\frac{10}{3}, -\frac{2}{3} \right) \right\}$$

e)

In[65]:= **Solve**[ $x - z + 2 == 0 \ \&\& \ -y + 3z + 2 == 0 \ \&\& \ x - 2y + 5z - 1 == 0$ , { $x, y, z$ }]

Out[65]= {}

Dakle, presek je prazan skup tj.  $s \not\parallel \alpha$ .