

20. zadatak

In[1]:= **Collect**[$x + y + z + \lambda (2x - 2z + 3)$, { x, y, z }]

Out[1]= $y + z (1 - 2\lambda) + 3\lambda + x (1 + 2\lambda)$

In[2]:= $n\pi = \{1 + 2\lambda, 1, 1 - 2\lambda\};$

In[3]:= $n\alpha = \{1, -4, -8\};$

In[4]:= **Solve**[$\frac{\text{Abs}[n\pi \cdot n\alpha]}{\text{Norm}[n\pi] * \text{Norm}[n\alpha]} == \text{Cos}\left[\frac{\pi}{4}\right], \lambda]$

Out[4]= $\left\{\left\{\lambda \rightarrow -\frac{1}{792}\right\}\right\}$

In[5]:= $y + z (1 - 2\lambda) + 3\lambda + x (1 + 2\lambda) /. \left\{\lambda \rightarrow -\frac{1}{792}\right\}$

Out[5]= $-\frac{1}{264} + \frac{395x}{396} + y + \frac{397z}{396}$

In[6]:= **TraditionalForm**[% == 0]

Out[6]//TraditionalForm=

$$\frac{395x}{396} + y + \frac{397z}{396} - \frac{1}{264} = 0$$

In[7]:= $n\pi2 = \{2, 0, -2\};$

In[8]:= **ArcCos**[$\frac{\text{Abs}[n\pi2 \cdot n\alpha]}{\text{Norm}[n\pi2] * \text{Norm}[n\alpha]}$]

Out[8]= $\frac{\pi}{4}$

Rešenja su $\pi: \frac{395x}{396} + y + \frac{397z}{396} - \frac{1}{264} = 0$ i $\pi2: 2x - 2z + 3 = 0$

21. zadatak

In[9]:= $tM = \{1, 1, 1\};$

In[10]:= $d = \frac{5}{\sqrt{14}};$

In[11]:= **Collect**[$5(x - 2) - (y - 11) == 0$, { x, y }]

Out[11]= $1 + 5x - y == 0$

In[12]:= **Collect**[$5(z - 2) - (y - 11) == 0$, { x, z }]

Out[12]= $1 - y + 5z == 0$

In[13]:= **Collect**[$1 + 5x - y + \lambda (1 - y + 5z)$, { x, y, z }]

Out[13]= $1 + 5x + y(-1 - \lambda) + \lambda + 5z\lambda$

In[14]:= $f[\{x_, y_, z_}\] := 1 + 5x + y(-1 - \lambda) + \lambda + 5z\lambda$

In[15]:= $n = \{5, -1 - \lambda, 5\lambda\};$

In[16]:= **Solve** $\left[\frac{\text{Abs}[f[tM]]}{\text{Norm}[n]} == d, \lambda\right]$

Out[16]= $\left\{\left\{\lambda \rightarrow \frac{2}{3}\right\}, \left\{\lambda \rightarrow \frac{3}{2}\right\}\right\}$

In[17]:= **1 + 5 x + y (-1 - λ) + λ + 5 z λ /. {λ → $\frac{2}{3}$ }**

Out[17]= $\frac{5}{3} + 5x - \frac{5y}{3} + \frac{10z}{3}$

In[18]:= **TraditionalForm[% == 0]**

Out[18]//TraditionalForm=

$$5x - \frac{5y}{3} + \frac{10z}{3} + \frac{5}{3} = 0$$

In[19]:= **1 + 5 x + y (-1 - λ) + λ + 5 z λ /. {λ → $\frac{3}{2}$ }**

Out[19]= $\frac{5}{2} + 5x - \frac{5y}{2} + \frac{15z}{2}$

In[20]:= **TraditionalForm[% == 0]**

Out[20]//TraditionalForm=

$$5x - \frac{5y}{2} + \frac{15z}{2} + \frac{5}{2} = 0$$

In[21]:= **$\frac{\text{Abs}[1 - 1 + 5 * 1]}{\text{Sqrt}[1^2 + 5^2]}$**

Out[21]= $\frac{5}{\sqrt{26}}$

Rešenja su : $\alpha 1 : 5x - \frac{5y}{3} + \frac{10z}{3} + \frac{5}{3} = 0$, $\alpha 2 : x - \frac{5y}{2} + \frac{15z}{2} + \frac{5}{2} = 0$

24. zadatak

In[22]:= **nα = {1, 2, -3};**

In[23]:= **nβ = {2, -3, 4};**

In[24]:= **ugao = ArcCos** $\left[\frac{\text{Abs}[n\alpha \cdot n\beta]}{\text{Norm}[n\alpha] * \text{Norm}[n\beta]}\right]$

Out[24]= **ArcCos** $\left[8\sqrt{\frac{2}{203}}\right]$

In[25]:= **ArcCos** $\left[8\sqrt{\frac{2}{203}}\right] // \text{N}$

Out[25]= 0.653326

In[26]:= **% / Degree**

Out[26]= 37.4328

25. zadatak

In[27]:= $\mathbf{n}\alpha = \{1, -4, 2\};$

In[28]:= $\mathbf{n}\beta = \{1, 2, -3\};$

In[29]:= $\mathbf{n}\gamma = \{1, 0, -1\};$

In[30]:= $\mathbf{vp} = \text{Cross}[\mathbf{n}\beta, \mathbf{n}\gamma]$

Out[30]= $\{-2, -2, -2\}$

In[31]:= $\text{ugao} = \frac{\pi}{2} - \text{ArcCos}\left[\frac{\text{Abs}[\mathbf{n}\alpha \cdot \mathbf{vp}]}{\text{Norm}[\mathbf{n}\alpha] * \text{Norm}[\mathbf{vp}]}\right]$

Out[31]= $\frac{\pi}{2} - \text{ArcCos}\left[\frac{1}{3\sqrt{7}}\right]$

In[32]:= $\text{ugao} // \text{N}$

Out[32]= 0.126324

In[33]:= $\% / \text{Degree}$

Out[33]= 7.23782

30. zadatak

In[34]:= $\mathbf{f}[\{\mathbf{x}_-, \mathbf{y}_-, \mathbf{z}_-\}] := \mathbf{x} - \mathbf{y} + 2\mathbf{z} - 3$

In[35]:= $\mathbf{tA} = \{1, -2, 0\};$

In[36]:= $\mathbf{tB} = \{-1, 2, 3\};$

In[37]:= $\mathbf{tC} = \{2, 1, 3\};$

In[38]:= $\mathbf{AB} = \mathbf{tA} + \mathbf{t} * (\mathbf{tB} - \mathbf{tA})$

Out[38]= $\{1 - 2\mathbf{t}, -2 + 4\mathbf{t}, 3\mathbf{t}\}$

In[39]:= $\mathbf{f}[\mathbf{AB}]$

Out[39]= 0

Sve tačke duži AB pripadaju ravni α .

In[40]:= $\mathbf{AC} = \mathbf{tA} - \mathbf{s} * (\mathbf{tC} - \mathbf{tA})$

Out[40]= $\{1 - \mathbf{s}, -2 - 3\mathbf{s}, -3\mathbf{s}\}$

In[41]:= $\mathbf{f}[\mathbf{AC}]$

Out[41]= $-4\mathbf{s}$

$\mathbf{f}[\mathbf{AC}] = 0$ za $\mathbf{s} = 0$, a za $\mathbf{s} = 0$ dobijamo tačku A.

-> Nijedna tačka duži AC, osim tačke A, ne pripada ravni α .

Nema potrebe da proveravamo za duž BC.

Presek ravni α i trougla ABC je duž AB.

In[42]:= **Solve**[$x - y + 2z - 3 == 0$, z]

Out[42]= $\left\{ \left\{ z \rightarrow \frac{1}{2} (3 - x + y) \right\} \right\}$

In[43]:= **Show**[
Graphics3D[{
 {**Red**, **Opacity**[0.5], **EdgeForm**[**Thick**], **Triangle**[{**tA**, **tB**, **tC**}]},
 { **Text**[**Style**["A", **Large**], **tA** + {0.2, 0.2, -0.2}}},
 { **Text**[**Style**["B", **Large**], **tB** + {0.2, 0.2, 0.4}}},
 { **Text**[**Style**["C", **Large**], **tC** + {0.2, 0.2, 0.2}}}
 }],
Plot3D[$\frac{1}{2} (3 - x + y)$, { x , -3, 3}, { y , -3, 3}, **Mesh** -> **None**],
Axes -> **True**]

