Question 23292

First, let us rewrite the equation of the line $x(t)=1+3t\,;\,y(t)=-2-2t\,;\,z(t)=2+4t$ in symmetrical form: $\frac{x-1}{3}=\frac{y+2}{-2}=\frac{z-2}{4}$. So, vector $\vec{a}(3\,;-2\,;4)$ goes along this line. The equation of plane, which goes through point $(x_0\,,y_0\,,z_0)$, with normal vector to it $\vec{n}(A\,,B\,,C)$ is $A(x-x_0)+B(y-y_0)+C(z-z_0)=0$. This plane must be perpendicular to $\vec{a}$, it means that $\vec{a}\|\vec{n}$, so in order to find $\vec{n}$, we need to make $\vec{a}$ unit vector. The length of $\vec{a}$ is $|\vec{a}|=\sqrt{9+4+16}=\sqrt{29}$. Hence, $\vec{n}\left(\frac{3}{\sqrt{29}}\,;-\frac{2}{\sqrt{29}}\,;\frac{4}{\sqrt{29}}\right)$, and equation of plane is $\frac{3}{\sqrt{29}}(x-2)-\frac{2}{\sqrt{29}}(y+1)+\frac{4}{\sqrt{29}}(z-3)=0$, or $3(x-2)-2(y+1)+4(z-3)=0$, or in canonical form $3x-2y+4z-20=0$.

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