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ALGORITHM OF THE SIMULATOR ON THE TOPIC "A STRAIGHT LINE IN SPACE"

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The report considers the algorithm of the simulator on the topic "A straight line in space"

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Each algorithm is analyzed with respect of computational accuracy. A comparison is given among the bounding algorithms with the aim of determining the right algorithms for correction requirements.

The report developed a simulator algorithm.

Step 1. A question appears on the screen. The user needs to choose one of the variants of answer, among which one is correct. If the right choice is made, then move to step 2. If not - an error reporting that contains the correct answer appears. Move to step 2.

How do we call the equation of a line in a space of the form

$$\begin{cases} A_1x + B_1y + C_1z + D_1 = 0, \\ A_2x + B_2y + C_2z + D_2 = 0. \end{cases}?$$

A) parametric;
B) canonical;
B) general;

D) the equation of a straight line that passes through two points.

Error reporting:

An equation of a straight line of the form $\begin{cases} A_1x + B_1y + C_1z + D_1 = 0, \\ A_2x + B_2y + C_2z + D_2 = 0. \end{cases}$ – this is a general equation of a straight line, as a line of intersection of planes with normals $\overrightarrow{N_1} = (A_1; B_1; C_1)$ и $\overrightarrow{N_2} = (A_2; B_2; C_2)$.

Step 2. A question appears on the screen. The user needs to choose one of the answers, among which one is correct. If the right choice is made, then move to step 3. If not – an error reporting that contains the correct answer appears. Move to step 3.

How do we call the equation of a line in a space of the form

$$\frac{x - x_0}{l} = \frac{y - y_0}{m} = \frac{z - z_0}{n}\ ?$$

A) parametric;
B) canonical;
B) general;
D) the equation of a straight line that passes through two points.

Error reporting:

An equation of a straight line of the form $\frac{x - x_0}{l} = \frac{y - y_0}{m} = \frac{z - z_0}{n}$ - is a canonical equation of the straight line, where $(x_0; y_0; z_0)$ – the point that belongs to a given line, l, m, n – the coordinates of the directing vector of the straight line.

Step 3. A question appears on the screen. The user needs to choose one of the variants of answers, among which one is correct. If the right choice is made, then move to step 4. If not - an error reporting that contains the correct answer appears. Move to step 4.

How do we call the equation of a line in a space of the form $$\frac{x-x_1}{x_2-x_1}=\frac{y-y_1}{y_2-y_1}=\frac{z-z_1}{z_2-z_1}$$?

A) parametric;
B) the equation of a straight line that passes through two points;
B) general;
D) canonical.

Error reporting:

An equation of a straight line of the form $\frac{x-x_1}{x_2-x_1}=\frac{y-y_1}{y_2-y_1}=\frac{z-z_1}{z_2-z_1}$ – is an equation of a straight line that passes through two points $(x_1;y_1;z_1)$ и $(x_2;y_2;z_2)$

Step 4. A question appears on the screen. The user needs to choose one of the answers, among which one is correct. If the right choice is made, then move to step 5. If not - an error reporting that contains the correct answer appears. Move to step 5.

How do we call the equation of a line in a space of the form $$\begin{cases} x=x_0+lt \\ y=y_0+mt \\ z=z_0+nt \end{cases}$$?

A) canonical;
B) the equation of a straight line that passes through two points;
B) general;
D) parametric.

Error reporting:

An equation of a straight line of the form $\begin{cases} x = x_0 + lt \\ y = y_0 + mt \\ z = z_0 + nt \end{cases}$ – is a parametric equasion of a straight line, where $(x_0; y_0; z_0)$ – is a point that belongs to a given line, l, m, n – the coordinates of the directing vector of the line, t – parameter.

Step 5. There is a task on the screen

Write the equation of a straight line that passes through two points $A(3;2;-1)$ and $B(4;-1;3)$

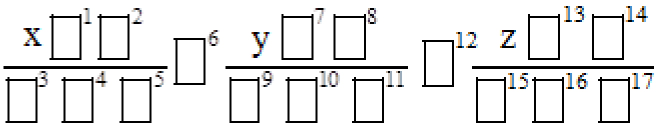

Fig. 1.

The user in one by one enters numerical values and symbols into active cells (in numerical order) (Fig. 1).

In the cell $\square^{2}$ either the value 3 or the value 4 is allowed to enter, since this is the abscissa of the given points. The remaining numeric values are entered, taking into account which value is selected in $\square^{2}$.

If entered incorrectly, an error reporting with the correct answer appears.

As a result, there should be

$$\frac{x-3}{4-3}=\frac{y-2}{-1-2}=\frac{z- -1}{3- -1}\text{, or}$$

$$\frac{x-4}{3-4}=\frac{y- -1}{2- -1}=\frac{z-3}{-1-3}$$

This thesis is concerned with the problem of efficiently analyzing large models of computer science obtaining the exact solution of such problems is often not possible to do easy. Approximation techniques have been proposed that importantly reduce the cost of computer analysis; however, these techniques lack bounds on errors that they introduce. The thesis proproses algorithms that bound rather than only estimates the of computer science solution.