1. **Find the solution of the system of equations  with a step  in the range of x**

**Solution:**

To build the chart, we need to enter data into the worksheet. Let's enter the word Argument in slot A1. We enter the first value of the argument 0 in slot A2, and the first value of the argument plus the construction step ( 0.2), in slot A3. Then we mark the block of grooves A2:A3 and fill it up to A17 with autofill.

Then it is required to enter the value of the function (sine). Let's write Sinus in slot B1. Let's move the cursor to slot B2. Here should be the value of the sine corresponding to the value of the argument in slot A2. Let's use a special function to get the value of the sine: press the fx button on the toolbar. In the opened Master function (step 1 of 2) dialog window, select Mathematical in the Category field. In the Select function field, we select the SIN function. We press the OK button.

The Sinus dialog box opens. We show the value of the argument of the sine by holding the mouse pointer in the A2 slot and pressing the left button. We press the OK button. As a result, 0 is obtained in slot B2. We copy this formula to slots B2:B17.

Let's write Cosine in slot C1. It is analogous to entering the value of cosine. As a result, a table corresponding to figure 5 is obtained.

|  |  |  |
| --- | --- | --- |
| Arqument | Sinus | Cosinus |
| 0 | 0 | 1 |
| 0,2 | 0,198669 | 0,980067 |
|  |  |  |
| 0,4 | 0,389418 | 0,921061 |
|  |  |  |
| 0,6 | 0,564642 | 0,825336 |
| 0,8 | 0,717356 | 0,696707 |
|  |  |  |
| 1 | 0,841471 | 0,540302 |
|  |  |  |
| 1,2 | 0,932039 | 0,362358 |
| 1,4 | 0,98545 | 0,169967 |
| 1,6 | 0,999574 | -0,0292 |
| 1,8 | 0,973848 | -0,2272 |
| 2 | 0,909297 | -0,41615 |
| 2,2 | 0,808496 | -0,5885 |
| 2,4 | 0,675463 | -0,73739 |
| 2,6 | 0,515501 | -0,85689 |
| 2,8 | 0,334988 | -0,94222 |
| 3 | 0,14112 | -0,98999 |
|  |  |  |
|  |  |  |

After that, you need to build the chart according to the data in the worksheet. For this, we press the Mactep diagram button on the toolbar. In the Mactep function (1 of 4) dialog window that opens, we select the type and subtype of the diagram. (figure 2). Then we press the Next button and show the range of data: B2:B17. We select the row content and indicate the range A2:A17 in the X axis field. Next, we press it. We enter the name of the chart - System, the names of the x and y axes Argument and Value. Press the Done button. We get a diagram of the curves of sine and cosine (Figure 5).

Figure 5

If we look at the diagram, we see that the system of equations has a solution (there is a point of intersection) and it is the only one. Thus, the solution of the system in the given range is the coordinates of the point of intersection of the curves. To find the coordinates, you need to move the mouse pointer over the intersection point and look at the floating help. The post appears in the following image:

Thus, the approximate solution of the system of equations is x=0.8; y=0.69670671.

1. **Construct the upper part of the ellipsoid given by the equation  in x or y ranges with a step of =0,5.**

**Solution:**

First, let's write x in slot A1. Let's enter the first value of the argument -3 in the slot A2, and the first value of the argument plus the build step, i.e. -2.5, in the slot A3. Mark the block of slots A2:A3 and fill the slots with auto-fill up to slot A14. Let's enter the value of variable y in the first line. For this, the first value of the y variable (-2) is entered into the slot B1. -1.5 is inserted into the slot C1. (-2+0.5). Then we fill the values ​​up to the slot J1 with autofill, marking the block of slots B1:C1.

Then we enter the value of the variable z. For this, we place the table cursor in the slot B2 and press the Вставка функции f button on the toolbar. In the Mactep function (step 1 of 2) dialog window that opens, select Math in the Категория field, and select sqrt in the function field. In the sqrt dialog window that opens, we enter the sqrt expression in the working field:

1-$A2^2/9-B$1^2/4

The $ sign is for fixing the addresses of column A - variable x and the first row - variable y. We press the OK button. #NUMBER in slot B2! It is obtained. (the ellipsoid viewed at the points x=-3 and y=-2 is not defined). Now we transfer the function from the slot B2 to the range B2:J2 with autofill. Then we transfer these formulas to the range B3:J14. As a result, the following table is obtained:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Arqument | -2 | -1,5 | -1 | -0,5 | 0 | 0,5 | 1 | 1,5 | 2 |
| -3 | #NUMBER! | #NUMBER! | #NUMBER! | #NUMBER! | 0 | #NUMBER! | #NUMBER! | #NUMBER! | #NUMBER! |
| -2,5 | #NUMBER! | #NUMBER! | 0,235702 | 0,493007 | 0,552771 | 0,493007 | 0,235702 | #NUMBER! | #NUMBER! |
| -2 | #NUMBER! | #NUMBER! | 0,552771 | 0,702179 | 0,745356 | 0,702179 | 0,552771 | #NUMBER! | #NUMBER! |
| -1,5 | #NUMBER! | 0,433013 | 0,707107 | 0,829156 | 0,866025 | 0,829156 | 0,707107 | 0,433013 | #NUMBER! |
| -1 | #NUMBER! | 0,571305 | 0,799305 | 0,909059 | 0,942809 | 0,909059 | 0,799305 | 0,571305 | #NUMBER! |
| -0,5 | #NUMBER! | 0,640095 | 0,849837 | 0,953794 | 0,986013 | 0,953794 | 0,849837 | 0,640095 | #NUMBER! |
| 0 | 0 | 0,661438 | 0,866025 | 0,968246 | 1 | 0,968246 | 0,866025 | 0,661438 | 0 |
| 0,5 | #NUMBER! | 0,640095 | 0,849837 | 0,953794 | 0,986013 | 0,953794 | 0,849837 | 0,640095 | #NUMBER! |
| 1 | #NUMBER! | 0,571305 | 0,799305 | 0,909059 | 0,942809 | 0,909059 | 0,799305 | 0,571305 | #NUMBER! |
| 1,5 | #NUMBER! | 0,433013 | 0,707107 | 0,829156 | 0,866025 | 0,829156 | 0,707107 | 0,433013 | #NUMBER! |
| 2 | #NUMBER! | #NUMBER! | 0,552771 | 0,702179 | 0,745356 | 0,702179 | 0,552771 | #NUMBER! | #NUMBER! |
| 2,5 | #NUMBER! | #NUMBER! | 0,235702 | 0,493007 | 0,552771 | 0,493007 | 0,235702 | #NUMBER! | #NUMBER! |
| 3 | #NUMBER! | #NUMBER! | #NUMBER! | #NUMBER! | 0 | #NUMBER! | #NUMBER! | #NUMBER! | #NUMBER! |

To build a diagram, click the Mactep diagram button on the Standard toolbar. In the opened Mactep diagram (step 1 of 4) dialog window, select the type of diagram – Поверхность, subtype – Проволочная (Прозачная) профессионстъ. (Fig. 6) Click the Next button.

In the Mactep diagrfmm dialog window that opens (step 2iz 4), we give the B2:J14 range in the Range field.

squeeze and pull from transmission to slot J14).

Figure 6

It is necessary to select row content and indicate the range A2:A14 in the x-axis Signature field. Then we press the first signature in the working field Row on Row1 and bring the mouse pointer to the Name field, activate the field by pressing the left mouse button. We enter the first value of the y variable here, i.e. -2

Then we show the second signature Row2 in the Row field and enter the second value of y -1.5 in the Имя working field. We fill up to row 9 in the same way (Figure 6)

Then click the Next button. In the Mactep diagram (step 3 из 4) dialog window, you need to enter the title of the diagram and the names of the axes. To do this, select Titles and enter x,y,z in the Ellipsoid Axis X, Axis Y, and Z fields in the Title diagram working area.Then we press the Done button (picture 6)

Note: By making the construction step small (for example, 0.1), the graph can be built more accurately.

1. **Finding the inverse of a matrix using Excel**



If a=1, the b=1 matrix is ​​called the inverse matrix of the A matrix.



To find the inverse matrix in MS Excel, the MINVERSE function is used

**Let's say**  **to the slot range A1:C3**

**matrix is ​​included. Find the inverse matrix.**

**Solution:** 1. Let's allocate a block of slots for the inverse matrix, for example, a block of slots A5:C7.

2. Click the Insert function button on the standard toolbar.

3. In the opened Master functions (step 1 of 2) dialog window, select Mathematical in the Category working field. In the Select a function field, select the MINVERSE function. Then click OK.

4. Let's move the MINVERSE dialog window aside and enter the range A1:C3 in the Massive workspace.

5. Press the CTRL+SHIFT+ENTER keys together.

6. If the inverse matrix is ​​not obtained in the range A5:C7, move the mouse pointer to the formula bar

CTRL+SHIFT+ENTER keys must be pressed together. As a result, the inverse matrix in the range A5:C7 is obtained:

|  |  |  |  |
| --- | --- | --- | --- |
|  | A | B | C |
| 1 | 4 | 8 | 7 |
| 2 | 5 | 11 | 6 |
| 3 | 3 | 20 | 9 |
| 4 |  |  |  |
| 5 | -0,12426 | 0,402367 | -0,1716 |
| 6 | -0,15976 | 0,088757 | 0,065089 |
| 7 | 0,39645 | -0,33136 | 0,023669 |

Figure 8

1. Matrices of the same size can be added (subtracted). The sum of mxn-dimensional matrices A= and B= is the matrix C=A+B. here  , 

**Suppose that A1:C2 contains matrix A and A4:C5 contains matrix B.**

****

**Get the matrix C=A+B.**

**Solution:**

1. Bring the table cursor to the upper left corner of the resulting matrix. For example, to the A7 slot.

2. Let's enter the first element of the result matrix =A1+A4.

3. Let's transfer this formula from slot A8 to slot C8 and then to slot C9. As a result, we will get a matrix that is the sum of the given matrices in the slot range A8:C9:

|  |  |  |  |
| --- | --- | --- | --- |
|  | A | B | C |
| 1 | 8 | 5 | 9 |
| 2 | 12 | 87 | 11 |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 | 5 | 41 | 88 |
| 6 | 41 | 13 | 7 |
| 7 |  |  |  |
| 8 | 13 | 46 | 97 |
| 9 | 53 | 100 | 18 |

Subtraction of matrices is performed analogously.

1. ** Find the solution of the system of equations with a step Δ=0,4 in the range of x**
2. ** Find the solution of the system of equations with a step Δ=0,1 in the range of x**
3. ** Find the solution of the system of equations with a step Δ=2 in the range of x**
4. **Construct the upper part of the ellipsoid given by the equation  in x or y ranges with a step of =1.**
5. **Construct the upper part of the ellipsoid given by the equation  in x or y ranges with a step of =1,5**
6. **Construct the upper part of the ellipsoid given by the equation  in x or y ranges with a step of =2**