

Laboratory work 01_1. Variables and Expressions.

In this lab, you work with variants. You get the number of variant from the teacher in practice.

Class work:

1. Two real numbers a and b are given. Get their sum, difference and product.

2. Real numbers x and y are given. Receive

$$\frac{|x| - |y|}{1 + |xy|}$$

3. Given the length of an edge of a cube. Find the volume of a cube and its lateral surface area.

4. Two real positive numbers are given. Find the arithmetic mean and geometric mean of these numbers.

5. Two real positive numbers are given. Find the arithmetic mean and geometric mean of their modules.

Variants:

1. Given x, y, z . Calculate a, b , if

$$a = \frac{\sqrt{|x-1|} - \sqrt[3]{|y|}}{1 + \frac{x^2}{2} + \frac{y^2}{4}}, \quad b = x(\operatorname{arctg} z + e^{-(x+3)});$$

2. Given x, y, z . Calculate a, b , if

$$a = \frac{3 + e^{y-1}}{1 + x^2 |y - \lg z|},$$
$$b = 1 + |y - x| + \frac{(y-x)^2}{2} + \frac{|y-x|^3}{3};$$

3. Given x, y, z . Calculate a, b , if

$$a = (1 + y) \frac{x + y/(x^2 + 4)}{e^{-x-2} + 1/(x^2 + 4)}, \quad b = \frac{1 + \cos(y-2)}{x^4/2 + \sin^2 z};$$

4. Given x, y, z . Calculate a, b , if

$$a = y + \frac{x}{y^2 + \left| \frac{x^2}{y + x^3/3} \right|}, \quad b = \left(1 + \operatorname{tg}^2 \frac{z}{2} \right);$$

5. Given x, y, z . Calculate a, b , if

$$a = \frac{2 \cos(x - \pi/6)}{1/2 + \sin^2 y}, \quad b = 1 + \frac{z^2}{3 + z^2/5};$$

6. Given x, y, z . Calculate a, b , if

$$a = \frac{1 + \sin^2(x + y)}{2 + |x - 2x/(1 + x^2 y^2)|} + x, \quad b = \cos^2\left(\operatorname{arctg} \frac{1}{z}\right);$$

7. Given x, y, z . Calculate a, b , if

$$a = \ln \left| \left(y - \sqrt{|x|} \right) \left(x - \frac{y}{z + x^2/4} \right) \right|,$$

$$b = x - \frac{x^2}{3!} + \frac{x^5}{5!}.$$

8. Given a side of an equilateral triangle. Find the area of this triangle.

9. Calculate the period of oscillation of a pendulum of length l .

10. Determine the force of attraction F between bodies of mass m_1 and m_2 located at a distance r from each other.

11. Given the hypotenuse and leg of a right triangle. Find the second leg and the radius of the inscribed circle. Find the area of the circle enclosed by this circle.

12. Determine the time after which two bodies will meet, moving towards each other with uniform acceleration, if their initial velocities, accelerations and the initial distance between them are known.

13. Find the sum of the members of an arithmetic progression.

14. Real numbers c, d are given. Calculate

$$\left| \frac{\sin^3 |cx_1^3 + dx_2^2 - cd|}{V(cx_1^3 + dx_2^2 - x_1)^2 + 3.14} \right| + \operatorname{tg}(cx_1^3 + dx_2^2 - x_1),$$

where x_1 is the larger, and x_2 is the smaller roots of the equation $x^2 - 3x - |cd| = 0$.

15. Given the legs of a right triangle. Find its hypotenuse and area.

16. Mixed v_1 liters of water at temperature t_1 with v_2 liters of water at temperature t_2 . Find the volume and temperature of the resulting mixture.

17. Determine the perimeter of a regular n -gon circumscribed about a circle of radius r .