STANDARD LEVEL - 2022

Open questions

Question 1S(6 pkt)

For what value of parameter m is the number (-2) a solution to the equation

$$x^2 + (2m+1)x + m + 4 = 0?$$

Given the value of parameter m, determine the second zero of this equation. For the obtained quadratic function $f(x) = x^2 + (2m+1)x + m + 4$ find the set of solutions of inequality

$$2f(x) > 1 + \sqrt{2}.$$

Question 2S(5 pkt)

Three natural numbers whose product is equal to 80 form an aritmetic sequence. If we decrease the second term of the sequence by 1, then the numbers (considered in the same order) will form a geometric sequence. Find these numbers.

Question 3S(5 pkt)

Solve the equation $\operatorname{tg}^2 x = \dfrac{1+\cos x}{1-\sin x}$.

Question 4S(5 pkt)

Points $A(0,1)$ and $B(4,3)$ are two consecutive vertices of a parallelogram. $S(2,2)$ is the intersection point of its diagonals. Find the coordinates of the remaining vertices of the parallelogram and calculate its area. Make a careful drawing.

Question 5S(6 pkt)

The lateral edge of a right and regular triangular pyramid is twice as long as the edge of the base. The sum of the length of all edges is equal to 18. Find the volume of the pyramid and the cosine of the angle of inclination of the sidewall to the base. Make a drawing.