2nd exam in Mathematics
(Ljubljana, 17. 1. 2017)

Time allowed: 90 min. All of the problems are equivalent. Please read the text of each problem carefully. Two A4 sheets with formulas are allowed. Results will be at `ucilnica.fri.uni-lj.si`.

All of the answers have to be justified!

1. For given functions

$$f(x) = x^2 + x - 8 \quad \text{and} \quad g(x) = 4 - x^2 - x$$

   find the area of the shape that lies in the halfplane $x \geq 0$ and is bounded by the graphs of functions f, g and y-axis.

2. For the triangle $\triangle ABC$ on vertices $A(2,1,1)$, $B(3,0,1)$, $C(4,1,-2)$:

   (a) Find a point D, such that $ABCD$ is a parallelogram.

   (b) Is the figure $ABCD$ a rectangle?

   (c) Find the circumference and area of the triangle $\triangle ABC$.

3. Let p be the line through the point $(-8,4,-6)$ and with direction $\vec{a} = (1,0,2)$. Let q be the line through the point $(5,5,-2)$ and with direction $\vec{b} = (2,1,-3)$.

   (a) Determine the equation of the plane Σ, which is parallel to p and q and contains the point $P(4,1,3)$.

   (b) What are the distances from p and q to Σ?

4. Given the matrix

$$A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & -1 \\ 0 & 2 & 1 \end{bmatrix},$$

   find all solutions of the system $A\vec{x} = [1,2,3]^T$.