

Constructive Geometry – Exam – SAMPLE

Name:

Date:

Points:

1)	2)	3)	4)	Test+Project:	Final Grade:

1) O[9,10], **landscape** format – **squared** sheet of paper24 points

In the axonometric projection ($u_x = \sqrt{2}/2$, $u_y = u_z = 1$, $\angle(x,z) = 135^\circ$, $\angle(y,z) = 90^\circ$) draw gate in the (x,z)-plane. The gate is made by two vertical line segments AB, CD and semi-circle k with one diameter BD, $A = [10, 0, 0]$, $B = [10, 0, 5]$, $C = [2, 0, 0]$, $D = [2, 0, 5]$. Draw the gate, for the arc use some construction. If the ray of light is line $s = BL$, $L = [6, 5, 0]$, construct shadow of the gate on the (x,y)-plane. The (y,z)-plane consider transparent.

2) O[8,14]24 points

A helical surface arises by the line segment AB, $A = [-2, 4, 1]$, $B = [-6, 4, 1]$. Axis of the surface is o , $o_I = [0, 4, 0]$, $v = 18$, the movement is left-hand.

- In the multiview projection draw the surface by 7 positions of AB well-proportioned on **half** of one turn of the surface.
- Construct point S, $S = [-3, 6.5, ?]$, on the surface.
- Name the surface.
- Calculate the length of the helix of the point A. Find parametric equations of this helix.

3)18 points

Find type, important points and basic parameters of the given quadric. Sketch it in an axonometric projection using at least one cross-section by some coordinate plane or plane parallel to a coordinate one.

- $x^2 - 2y^2 + z^2 - 4x + 4z + 4 = 0$
- $2y^2 - 2x - 12y + 9 = 0$
- $x^2 + y^2 + z^2 + 2x + 6z + 1 = 0$

4)14 points

Point function of the given curve is $X(t) = \left[1 + 4 \sin t, 6 + 4 \cos t, \frac{12}{\pi} t + 3 \right], t \in R$. At the point A, $A = [?, 6, 9]$, on the curve find general equation of the normal plane and an equation of the binormal of the Frenet Frame. Set vectors of the lines of Frenet Frame so that the coordinate system formed by them is right-hand.