TeComp

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Strengthening Teaching Competences
in Higher Education
in Natural and Mathematical Sciences

Blended learning Mathematics contents in dynamic geometry environment

Durdica Takaci

University of Novi Sad, Serbia

Content:

- VECTORS IN DINAMIC ENVIRONMENT

- DEFINITE INTEGRAL IN DINAMIC ENVIRONMENT

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Content:

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QUESTIONS:

How is blended learning created in a dynamic learning environment?

How can the surface area and the body volume in a vector dynamic learning environment be determined?

How can the lateral area and the volume of solid of revolution be determined by using a definite integral in a dynamic learning environment?

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VECTORS IN DINAMIC ENVIRONMENT

Blended learning is created by the integration of new information and communication technologies, ICT, into the teaching process.

In the late 1990s and early 21st centuries, blended learning developed intensively with the advent of the Internet and the World Wide Web. But during the Covid 9 crisis it became the only learning method in the world.

By the term blended learning we will understand: distance learning, E-learning, as well as face-to-face learning.
The basic characteristics of distance learning are the physical distance between teacher and student

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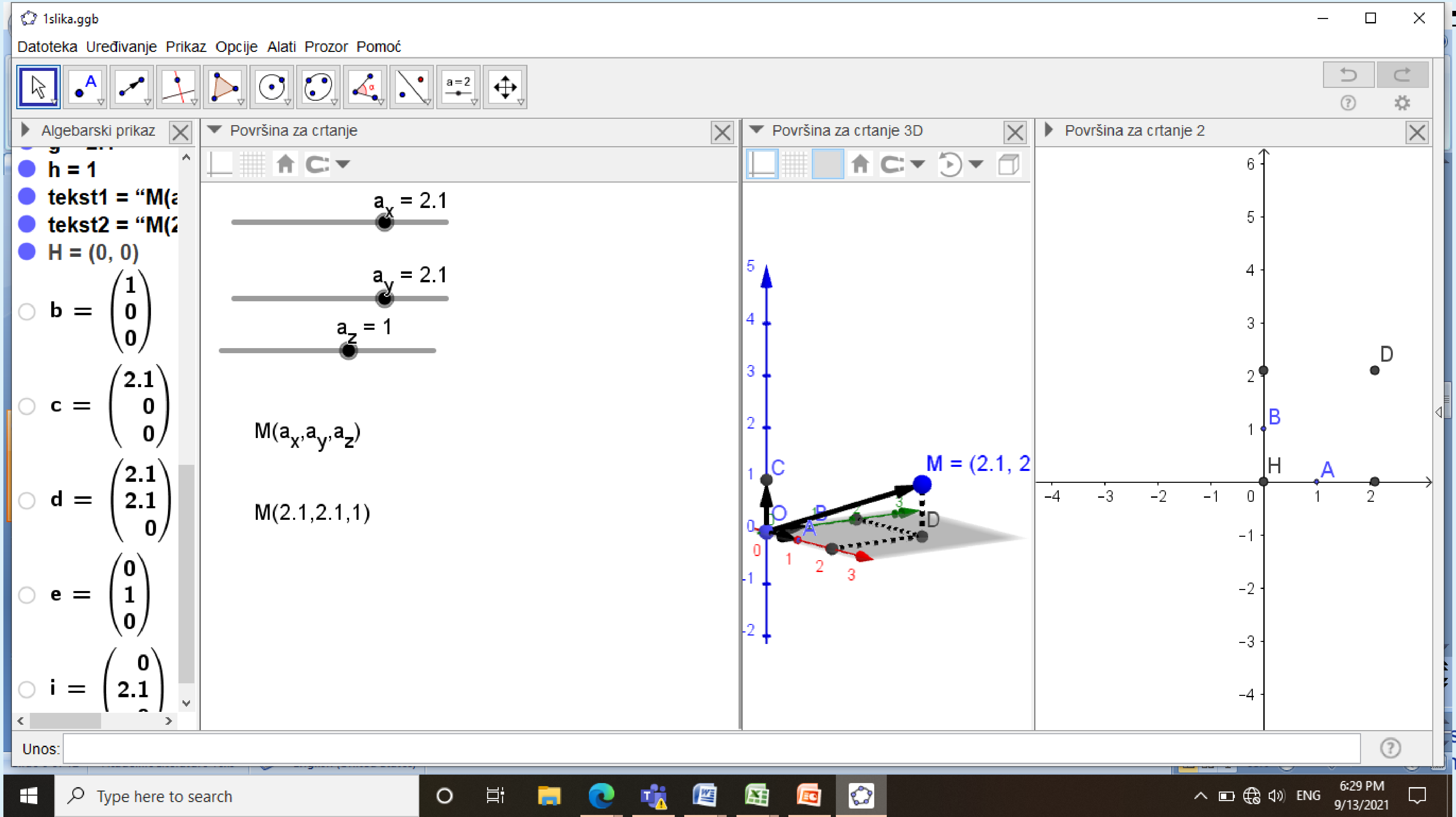
VECTORS IN DINAMIC ENVIRONMENT



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VECTORS IN DINAMIC ENVIRONMENT

$\vec{OM} = 3\vec{i} + (-2)\vec{j} + (1)\vec{k}, \quad \vec{ON} = 2.8\vec{i} + (1)\vec{j} + (2.2)\vec{k}, \quad \vec{OP} = -1\vec{i} + (1)\vec{j} + (4)\vec{k}$

Mešoviti proizvod

$(\vec{OM} \times \vec{ON}) \circ \vec{OP} = \vec{d} \circ \vec{OP} = |\vec{d}||\vec{OP}|\cos(\angle(\vec{a}, \vec{d})) = P_p|\vec{OP}|\cos(\angle(\vec{OP}, \vec{d})) = 36$

$V = 36, \quad \alpha = 38.5°$

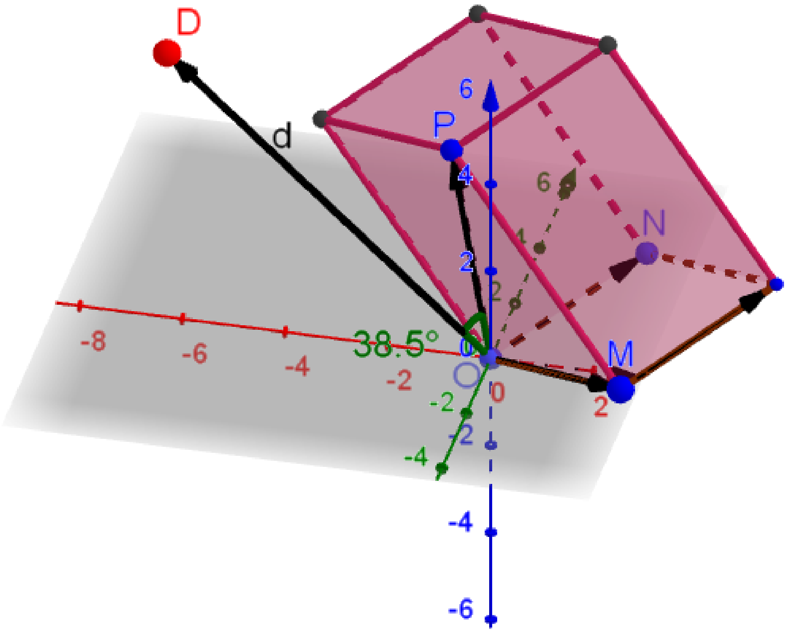
$\vec{d} = \vec{OM} \times \vec{ON} = -5.4\vec{i} - (3.8)\vec{j} + (8.6)\vec{k}$

$$(\vec{OM} \times \vec{ON}) \circ \vec{OP} = \begin{vmatrix} 3 & -2 & 1 \\ 2.8 & 1 & 2.2 \\ -1 & 1 & 4 \end{vmatrix} = 36$$

$c_x = -1$

$b_x = 2.8$ $b_y = 1$ $b_z = 2.2$ $c_y = 1$

$a_x = 3$ $a_y = -2$ $a_z = 1$ $c_z = 4$



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VECTORS IN DINAMIC ENVIRONMENT

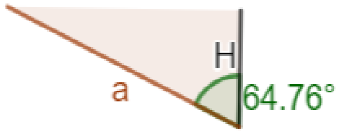
Zapremina paralelopipeda -- Mešoviti proizvod vektora $\vec{a} \circ (\vec{b} \times \vec{c})$

Paralelopiped određen vektorima $\vec{a} = \vec{OA} = \begin{pmatrix} -1 \\ 3 \\ 1 \end{pmatrix} = \begin{pmatrix} p \\ 3 \\ 1 \end{pmatrix}, \quad \vec{b} = \vec{OB} = \begin{pmatrix} 2 \\ 1 \\ 1 \end{pmatrix}, \quad \vec{c} = \vec{OC} = \begin{pmatrix} 4 \\ -1 \\ -1 \end{pmatrix} = \begin{pmatrix} 4 \\ p \\ p \end{pmatrix}$

P_O=8.49 $\quad V = 12$

$$\vec{d} = (\vec{b} \times \vec{c}) = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 2 & 1 & 1 \\ 4 & -1 & -1 \end{vmatrix} = 6\vec{j} + (-6)\vec{k}$$

$$\vec{a} \circ (\vec{b} \times \vec{c}) = \begin{vmatrix} -1 & 3 & 1 \\ 2 & 1 & 1 \\ 4 & -1 & -1 \end{vmatrix} = 12$$



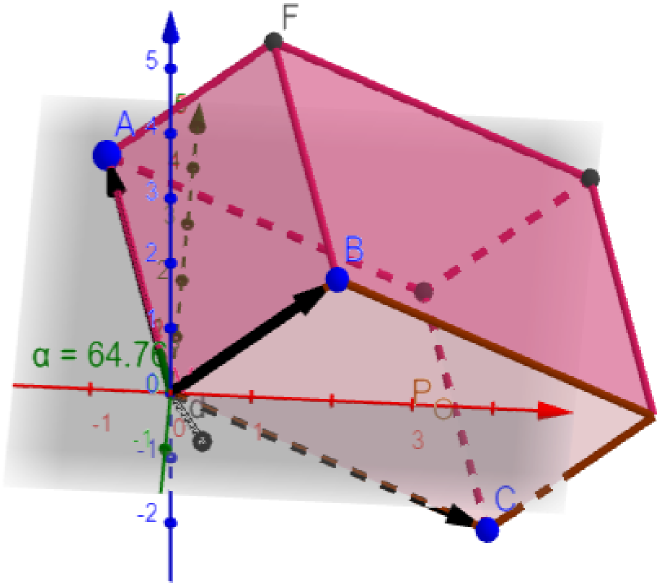
$$\vec{a} \circ (\vec{b} \times \vec{c}) = \vec{a} \circ \vec{d} = |\vec{a}||\vec{d}| \cos(\angle(\vec{a}, \vec{d})) = P_{\vec{b},\vec{c}} |\vec{a}| \cos(\angle(\vec{a}, \vec{d})) = B * H$$

$$= 8.49 * 3.32 * (0.43) = 12$$

$$\cos(\alpha) = \frac{H}{a}$$

p = -1

☑ 1 ☑ 2 ☑ 3 ☑ 4V ☑ 5 ☑ 6 ☑ 7 ☐ 8 ☑ 9



VECTORS IN DINAMIC ENVIRONMENT

Task: The vectors $\vec{a} = a_x\vec{i} + a_y\vec{j} + a_z\vec{k}$, $\vec{b} = b_x\vec{i} + b_y\vec{j} + b_z\vec{k}$ and $\vec{c} = c_x\vec{i} + c_y\vec{j} + c_z\vec{k}$ are given.

- Determine the vector $\vec{a} = \frac{\vec{a}}{2} + 2\vec{b} - \vec{c}$;
- Determine the surface area of the triangle forming the vectors $\vec{a}$ and $\vec{c}$;
- Determine the height corresponding to the side $\vec{a}$ of the parallelogram formed by the vectors $\vec{a}$ and $\vec{b}$;
- Determine the volume of a parallelepiped formed by vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$;
- Determine the equation of a plane that is parallel to the plane formed by the vectors $\vec{a}$ and $\vec{b}$, and which contains a point $A(x_0, y_0, z_0)$.

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DEFINITE INTEGRAL IN DINAMIC ENVIRONMENT

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Površina pomoću integrala

Đurđica Takači

UNS Novi Sad

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DEFINITE INTEGRAL IN DINAMIC ENVIRONMENT

$$f(x) = \frac{x^2}{4} + 1, \quad x \in [0,4] \qquad \Delta x = \frac{4}{n} = \frac{4}{4} = 1$$

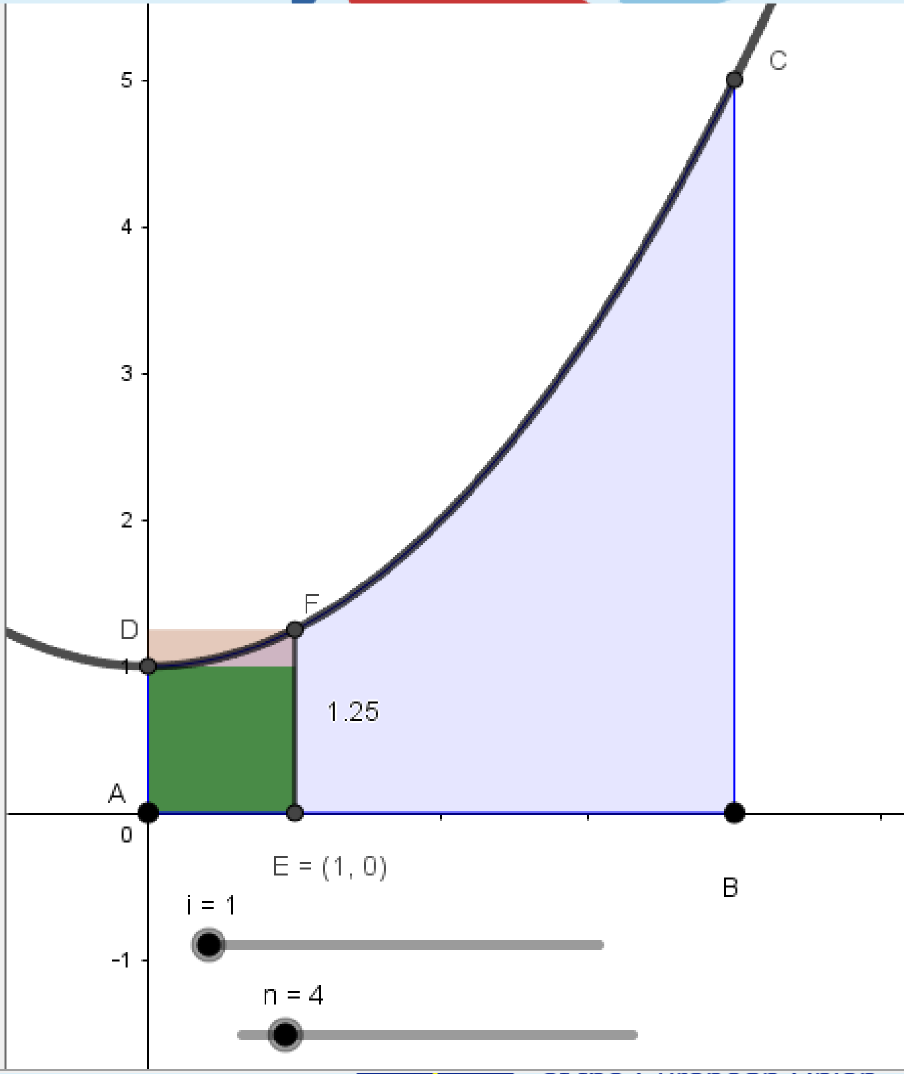
$$\sum_{i=1}^{4} f(x_{i-1})\Delta x = \Delta x(1 + 1.25 + 2 + 3.25) = 7.5$$

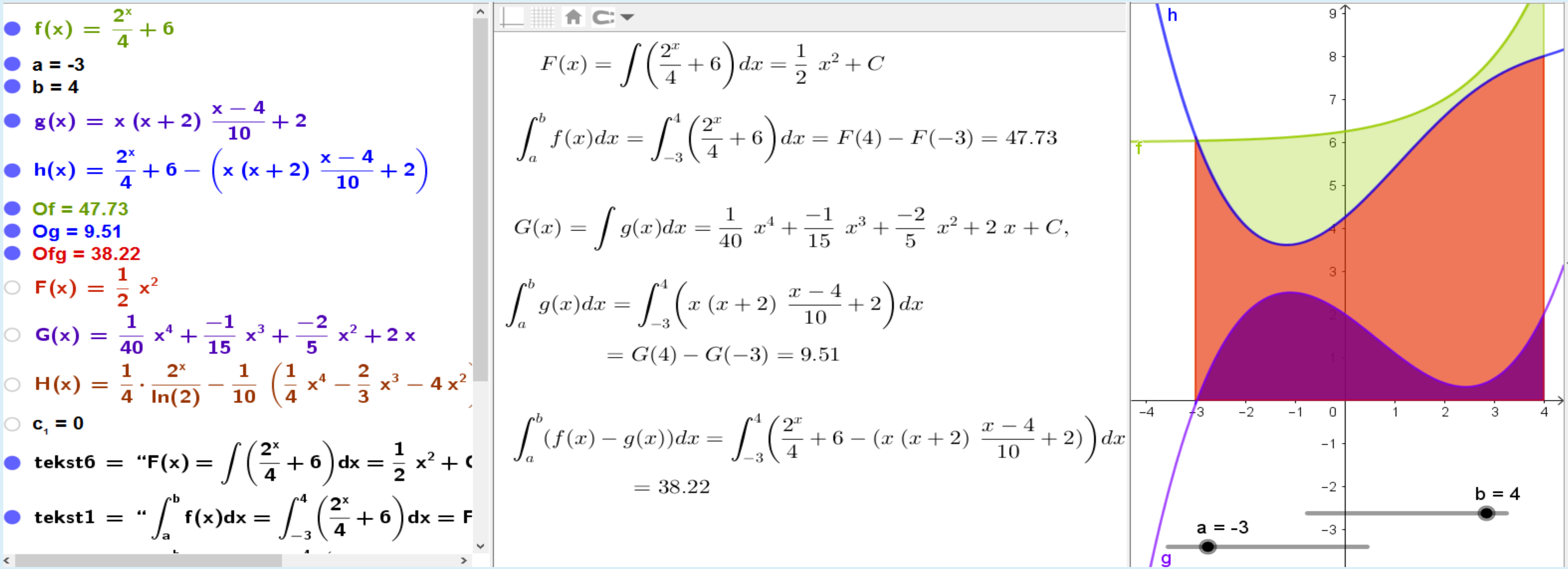
$$\sum_{i=1}^{4} f(x_i)\Delta x = \Delta x(1.25 + 2 + 3.25 + 4) = 11.5$$

Šta se dešava ako se broj podintervala povećava?

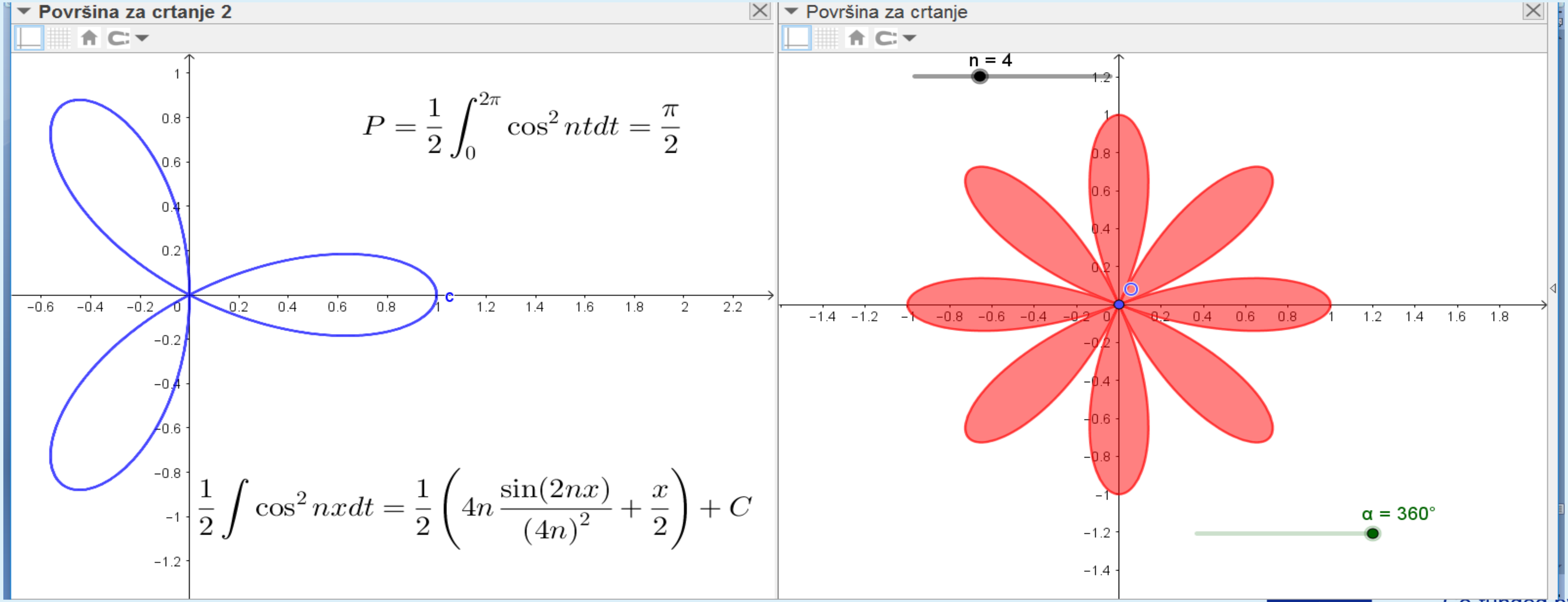
Ako je n=8 odrediti zbir površina opisanih i upisanih pravougaonika.

☑ Up ☑ ZbirUp ☑ Op ☑ ZbirOp ☑ Pit

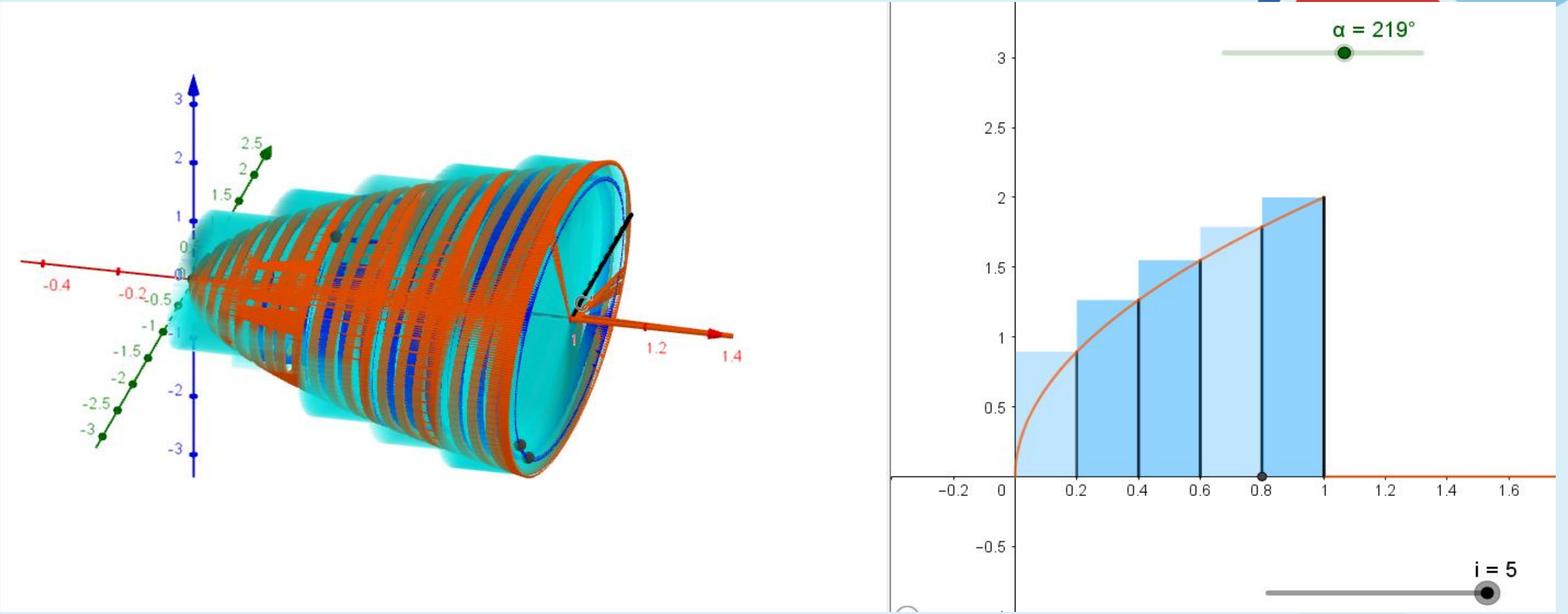



f(x) = 2^x/4 + 6
a = -3
b = 4
g(x) = x (x + 2) (x − 4)/10 + 2
h(x) = 2^x/4 + 6 − (x (x + 2) (x − 4)/10 + 2)
Of = 47.73
Og = 9.51
Ofg = 38.22
F(x) = 1/2 x²
G(x) = 1/40 x⁴ + −1/15 x³ + −2/5 x² + 2 x
H(x) = 1/4 · 2^x/ln(2) − 1/10 (1/4 x⁴ − 2/3 x³ − 4 x²
c₁ = 0
tekst6 = "F(x) = ∫(2^x/4 + 6)dx = 1/2 x² +
tekst1 = "∫_a^b f(x)dx = ∫_{−3}^4 (2^x/4 + 6)dx = F
F(x) = ∫(2^x/4 + 6)dx = 1/2 x² + C
∫_a^b f(x)dx = ∫_{−3}^4 (2^x/4 + 6)dx = F(4) − F(−3) = 47.73
G(x) = ∫ g(x)dx = 1/40 x⁴ + −1/15 x³ + −2/5 x² + 2 x + C,
∫_a^b g(x)dx = ∫_{−3}^4 (x (x + 2) (x − 4)/10 + 2)dx
= G(4) − G(−3) = 9.51
∫_a^b (f(x) − g(x))dx = ∫_{−3}^4 (2^x/4 + 6 − (x (x + 2) (x − 4)/10 + 2))dx
= 38.22
h
f
g
b = 4
a = -3

The area


Površina za crtanje 2
$P = \frac{1}{2}\int_0^{2\pi} \cos^2 nt dt = \frac{\pi}{2}$
$\frac{1}{2}\int \cos^2 nx dt = \frac{1}{2}\left(4n\frac{\sin(2nx)}{(4n)^2} + \frac{x}{2}\right) + C$
Površina za crtanje
n = 4
α = 360°

Volume of solid of revolution



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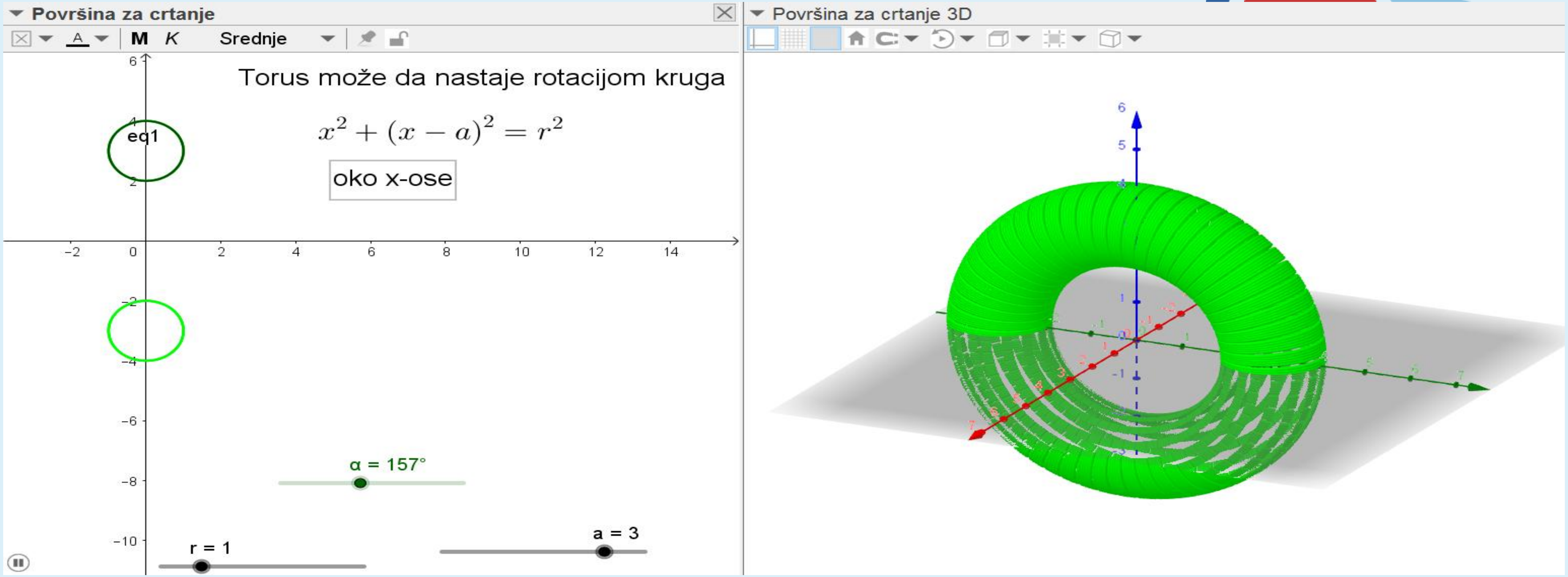

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