



AKADEMIA EDUKACYJNO - INŻYNIERSKA

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MATURA STUDIA PRAKTYKA STAŻ PRACA BIZNES PRZEMYSŁ STEAM

KOMPLEKSOWE WSPARCIE EDUKACYJNE ON – LINE NA KAŻDYM ETAPIE KSZTAŁCENIA INŻYNIERSKIEGO

email: kontakt@e-mechanik.com.pl

web: www.e-MECHANiK.com.pl

fb: www.facebook.com/groups/emechanik

tel: (+48) - 697-165-075

ANALIZA MATEMATYCZNA I

"CAŁKA I - POLE OBSZARU OGRANICZONEGO KRZYWYMI"

PROJEKT

Oblicz:

– pole obszaru

ograniczonego krzywymi.

DANE:

$$y(x) = OK$$

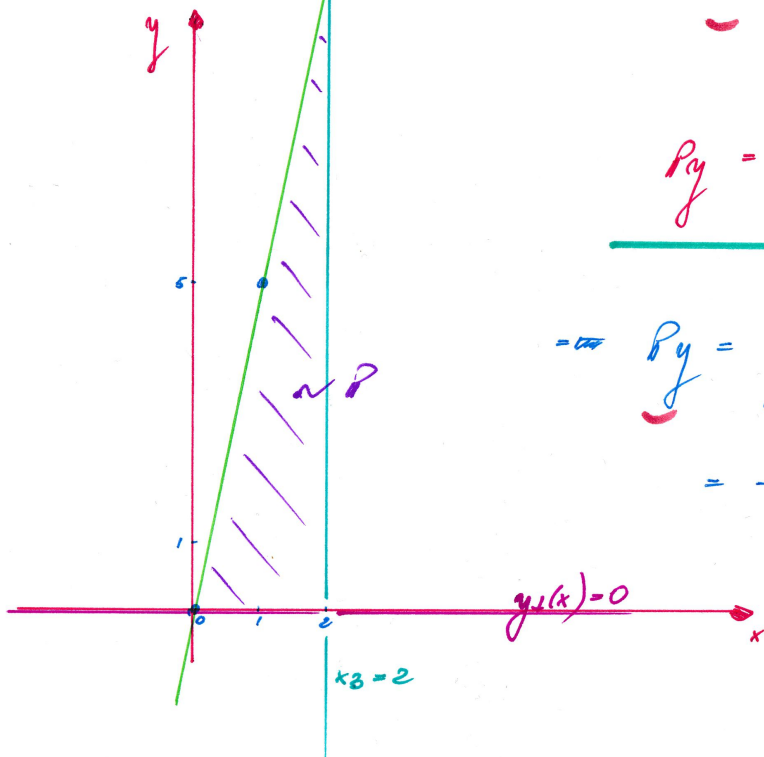
SZUKAM:

$$P = ?$$

$$y_1(x) = 0$$

$$y_2(x) = 5x$$

$$x_3 = 2$$



$$P_x = \int_0^2 (y_2(x) - y_1(x)) dx$$

$$\Rightarrow P_x = \int_0^2 (5x - 0) dx = 5 \int_0^2 x dx = \left[\frac{5}{2} x^2 + C \right]_0^2 = 10$$

$$P_y = \int_0^{10} (x_3 - x_2(y)) dy$$

$$y_2(x) = 5x$$

$$x_2(y) = \frac{1}{5}y$$

$$\Rightarrow P_y = \int_0^{10} (2 - \frac{1}{5}y) dy = \left[-\frac{1}{10}y^2 + 2y + C \right]_0^{10} =$$

$$= -10 + 20 = 10$$

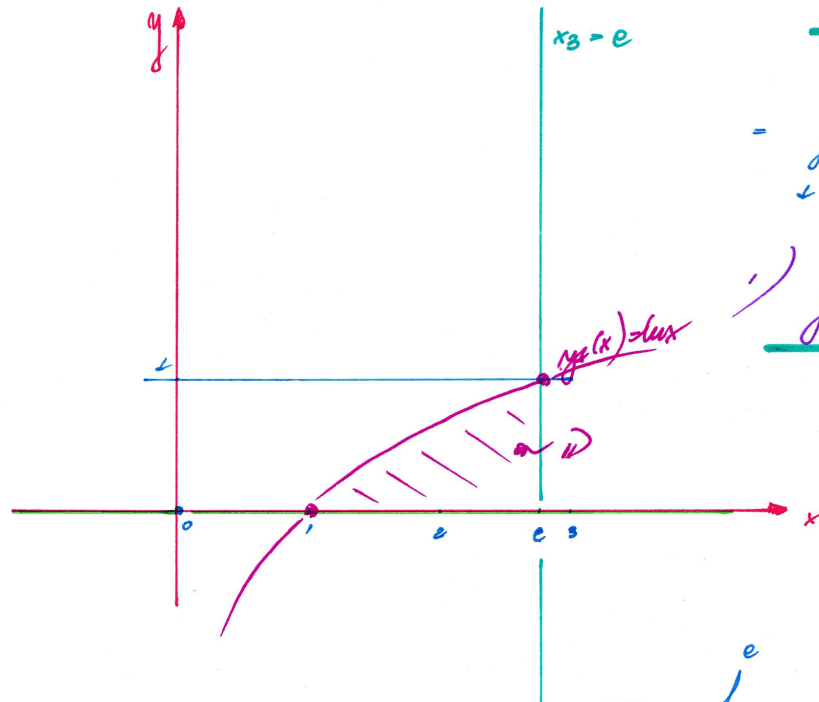
$$\begin{cases} y_1(x) = \ln x \\ y_2(x) = 0 \\ x_3 = e \end{cases}$$

$$\log_e b = c \Rightarrow a^c = b$$

$$P_K = \int_1^e (y_1(x) - y_2(x)) dx =$$

$$= \int_1^e \ln x dx$$

$$\int \ln x dx = \quad \begin{matrix} f = \ln x & g' = 1 \\ f' = \frac{1}{x} & g = x \end{matrix}$$



$$= \int_1^e x \ln x - \int_1^e \frac{1}{x} \cdot x dx = x \ln x - x + C$$

$$= \int_1^e \ln x dx = [x \ln x - x + C]_1^e = [e \ln e - e + C] - [\ln 1 - 1 + C] =$$

$$= (e \ln e) - e - \ln 1 + 1 = e - e - 0 + 1 = 1$$

$$y_1(x) = x^2 - x - 6$$

$$y_2(x) = -x^2 + 5x + 14$$

$$y_1(x) = x^2 - x - 6$$

$$\Delta = B^2 - 4AC$$

$$\Delta = 1 + 24$$

$$\Delta = 25$$

$$\sqrt{\Delta} = 5$$

$$x_1 = \frac{1-5}{2} = -2$$

$$x_2 = \frac{1+5}{2} = 3$$

$$y_1(x) = (x+2)(x-3)$$

$$y_2(x) = -x^2 + 5x + 14$$

$$\Delta = B^2 - 4AC$$

$$\Delta = 25 + 84$$

$$\Delta = 109$$

$$\sqrt{\Delta} = 10.44$$

$$x_1 = \frac{-5-10.44}{-2} = 7.72$$

$$x_2 = \frac{-5+10.44}{-2} = -2.72$$

$$y_2(x) = -(x-7.72)(x+2.72)$$

$$y_1(x) - y_2(x)$$

$$(x+2)(x-3) - (x-7.72)(x+2.72)$$

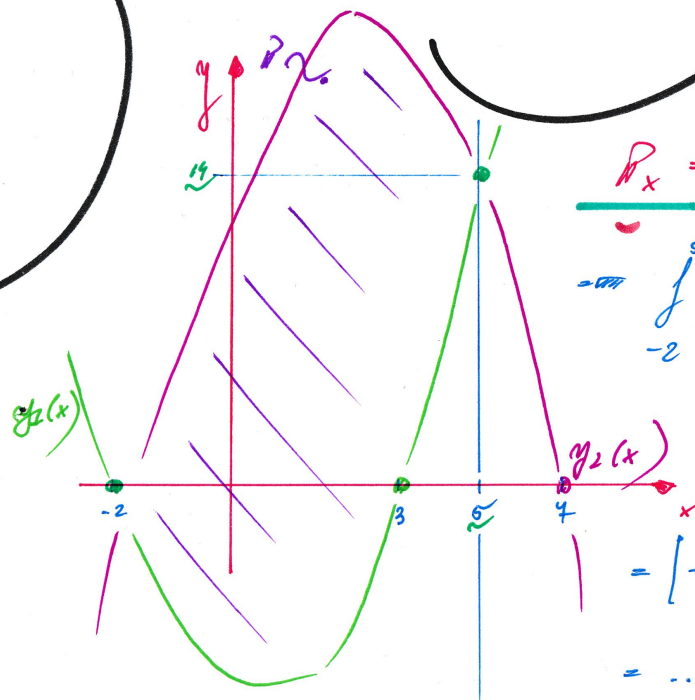
$$x-3 = -x+7.72$$

$$2x = 10.72$$

$$x = 5.36$$

$$y_1(5) = 25 - 5 - 6 = 14$$

$$y_2(5) = -25 + 25 + 14 = 14$$



$$R_x = \int_{-2}^5 (y_2(x) - y_1(x)) dx$$

$$= \int_{-2}^5 (-x^2 + 5x + 14 - x^2 + x + 6) dx$$

$$= \int_{-2}^5 (-2x^2 + 6x + 20) dx =$$

$$= \left[-\frac{2}{3}x^3 + 3x^2 + 20x + C \right]_{-2}^5 =$$

$$= \dots 114.3 \text{ [J}^2\text{]}$$

