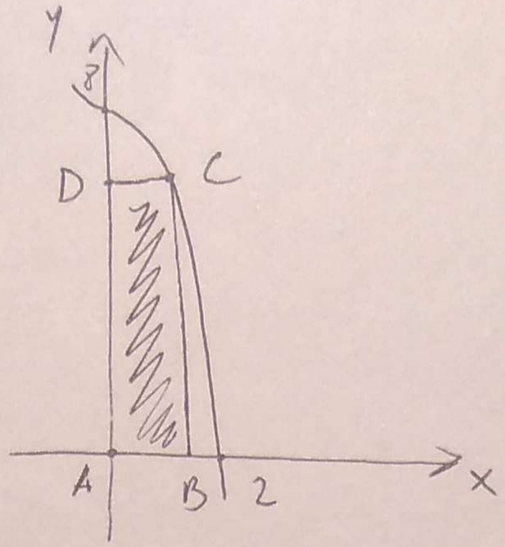
Ушаков М.А.

1. $A(0,0)$
$B(u,0)$
$C(u,v)$
$D(0,v)$

$y = -x^3 + 8$



$S = u \cdot v = -u^4 + 8u \qquad v = -u^3 + 8$

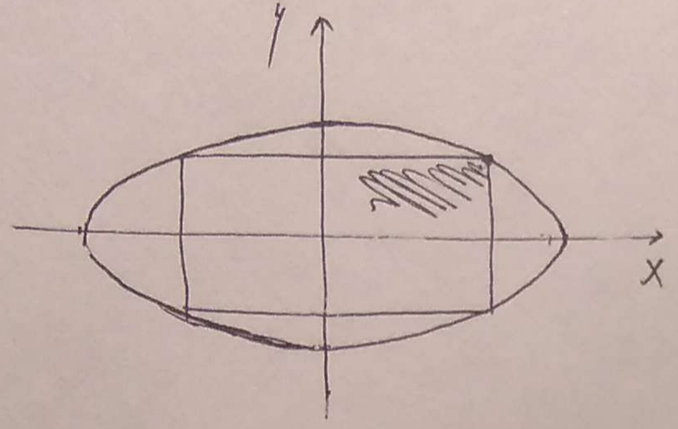
$S' = -4u^3 + 8$

$-4u^3 + 8 = 0$

$u = \sqrt[3]{2} \qquad v = -2 + 8 = 6$

$S_{max} = 6\sqrt[3]{2}$

2.



$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

$S = x \cdot y \cdot 4$

$y = b\sqrt{1 - \frac{x^2}{a^2}}$

$S = 4xb\sqrt{1 - \frac{x^2}{a^2}}$

$S' = 4b\sqrt{1 - \frac{x^2}{a^2}} + 4xb\,\frac{\frac{-2x}{a^2}}{\left(1 - \frac{x^2}{a^2}\right)^{\frac{1}{2}}} = \frac{4b}{a}\sqrt{a^2 - x^2} - \frac{4b}{a}\,\frac{x^2}{\sqrt{a^2 - x^2}} =$

$= \frac{4b}{a}\,\frac{a^2 - x^2 - x^2}{\sqrt{a^2 - x^2}} = \frac{4b}{a}\,\frac{a^2 - 2x^2}{\sqrt{a^2 - x^2}}$

$a^2 - 2x^2 = 0$

$x = \sqrt{\frac{a^2}{2}} = \frac{a}{\sqrt{2}} \qquad y = b\sqrt{1 - \frac{a^2}{2a^2}} = \frac{b}{\sqrt{2}}$

$S_{max} = 4xy = 4\frac{ab}{2} = 2ab$