Mathematical analysis. Lesson 7. Homework

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1

$\begin{cases} 2x + 2y = 144 \\ s = xy \end{cases} \quad \begin{cases} x + y = 72 \\ s = xy \end{cases} \quad \begin{cases} y = 72 - x \\ s = x(27 - x) \end{cases}$

$s' = x'(27 - x) + x(72 - x)' = 72 - x - x = 72 - 2x$

s'=72-2x=0

2x=72

x=36

y=72-x=36

s = $36^2 = 1296$

2

2.1

$y = |2x|$

$y' = (|2x|)' = \frac{2x}{|2x|} \cdot 2 = \frac{4x}{|2x|} = 0 => x = 0$

$y'(-1) = \frac{-4}{|-2|} = -\frac{4}{2} = -2$

$y'(1) = \frac{4}{|2|} = \frac{4}{2} = 2$

x=0 - is local minimum.

2.2

$y = x^3$

$y' = 3x^2 = 0 => x = 0$

$y'(-1) = 3$

$y'(1) = 3$

x=0 - is not extremum.

2.3

$y = e^{3x}$

$y' = 3e^{3x}$

This function doesn't have any extremum.

2.4

$y = x^3 - 5x$
$y' = 3x^2 - 5 = 0$
$D = b^2 - 4ac = 60$
$x1 = \frac{\sqrt{60}}{6} = \frac{\sqrt{15}}{3} \approx 1.19$
$x2 = -\frac{\sqrt{60}}{6} = -\frac{\sqrt{15}}{3}$
$y'(-2) = 12 - 5 = 7 > 0$
$y'(-1) = 3 - 5 = -2 < 0$
$y'(1) = 3 - 5 = -2 < 0$
$y'(2) = 12 - 5 = 7 > 0$
x1 is local minimum.
x2 is local maximum.