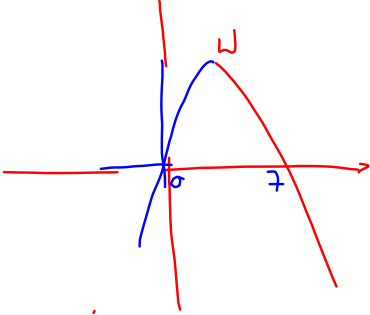


$f(x) = -2x^2 + 14x$
 $f(x) = -2\left(\frac{x^2 - 7x}{a^2 - 2ab + b^2}\right) = -2\left[\frac{x^2 - 7x + \frac{49}{4}}{6^2} - 12\frac{1}{4}\right] =$
 $= -2(x - 3,5)^2 + 24\frac{1}{2}$

$a = -2$
 $W(3,5; 24\frac{1}{2})$

1) $\mathbb{D}: x \in \mathbb{R}$
 2) $W: y \in (-\infty, 24\frac{1}{2}]$
 3) $RL: y = 0 \Leftrightarrow x \in [0; 7]$



$f(x) = -2x^2 + 14x = -2(x^2 - 7x) =$
 $f(x) = -2x(x - 7)$

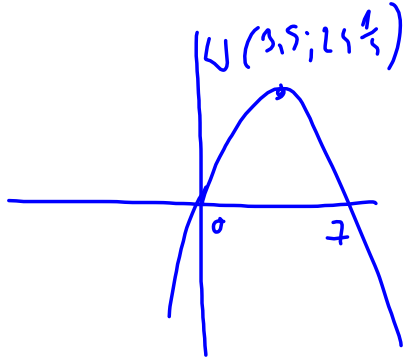
$f(x) = 0 \Leftrightarrow -2x(x - 7) = 0$
 $\underline{x = 0} \vee \underline{x = 7}$

4) Monotonia:
 $x \in (-\infty; 3,5) \Rightarrow f \nearrow$
 $x \in (3,5; +\infty) \Rightarrow f \searrow$

5) wartość największą $y_{\max}(3,5) = 24\frac{1}{2}$

6) $y > 0 \Leftrightarrow x \in (0; 7)$
 $y < 0 \Leftrightarrow x \in (-\infty, 0) \cup (7, +\infty)$

7) osią symetrii $x = 3,5$



$$y = \frac{1}{3}x^2 - 18x - 21$$

$$f(x) = \frac{1}{3}(x^2 - 54x) - 21 = \frac{1}{3}\left[(x-27)^2 - 27^2\right] - 21$$

$$f(x) = \frac{1}{3}(x-27)^2 - \frac{1}{3} \cdot 27^2 - 21$$

$$\frac{1}{3} \cdot 27^2 = 3^2 \cdot \frac{1}{3} = 3^5$$

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$$f(x) = \frac{1}{3}(x-27)^2 - 243 - 21$$

$$f(x) = \frac{1}{3}(x-27)^2 - 264$$

$$a = \frac{1}{3} \cup (27; -264)$$

$$\underbrace{a = \frac{1}{3}} \cup \underbrace{(27; -264)}$$

$$\frac{1}{3}(x-27)^2 - 264 = 0 \quad | +264 | :3$$

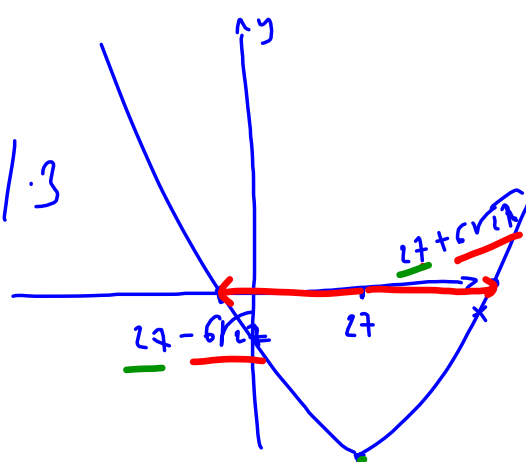
$$(x-27)^2 = 3 \cdot 3 \cdot 88$$

$$(x-27)^2 = 9 \cdot 4 \cdot 22$$

$$x-27 = \sqrt{9 \cdot 4 \cdot 22} \quad \vee \quad x-27 = -\sqrt{9 \cdot 4 \cdot 22}$$

$$x = 27 + 3 \cdot 2 \sqrt{22}$$

$$x = 27 - 3 \cdot 2 \sqrt{22}$$



$$p = \frac{x_1 + x_2}{2}$$

x_1, x_2 - m. l. l.

$$y = 3x^2 - 18x - 21$$

$$y = 3(x^2 - 6x) - 21$$

$$y = 3[(x-3)^2 - 9] - 21$$

$$y = 3(x-3)^2 - 27 - 21$$

$$y = 3(x-3)^2 - 48 \quad \cup(3, -48)$$

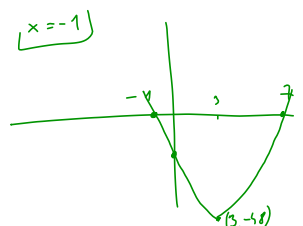
$$f(x) = 0 \Leftrightarrow 3(x-3)^2 - 48 = 0$$

$$3(x-3)^2 = 48 \quad | :3$$

$$(x-3)^2 = 16$$

$$\sqrt{\quad} \quad \sqrt{\quad} \quad \sqrt{\quad} \quad \sqrt{\quad} \quad \sqrt{\quad} \quad \sqrt{\quad}$$

$$x-3 = 4 \quad \vee \quad x-3 = -4$$

$$x = 7 \quad \vee \quad x = -1$$


$$f(x) = 3(x-3)^2 - 48$$

$$3[(x-3)^2 - 16] = 3(x-3-4)(x-3+4)$$

$$a^2 - b^2 = (a-b)(a+b)$$

$$f(x) = 3(x-7)(x+1)$$