1

$$y' - 2xy = e^{x^2}$$

homogenní řešení:

$$y' - 2xy = 0$$

$$y' = 2xy$$

$$\int \frac{y'}{y}\,dy = \int 2x\,dx \quad \longrightarrow y \neq 0$$

$$\ln|y| = x^2 + C$$

$$y_h = e^{x^2} \cdot e^C$$

$$y_h = e^{x^2} D \;,\; x \in \mathbb{R},\; D \in \mathbb{R}$$

variace:

$$y_p = D(x) \cdot e^{x^2}$$

$$y_p' = D'(x) \cdot e^{x^2} + D(x) \cdot e^{x^2} \cdot 2x$$

$$y_p' - 2x y_p = e^{x^2}$$

$$D'(x) \cdot e^{x^2} + \cancel{D(x) \cdot e^{x^2} \cdot 2x} - \cancel{2x \cdot D(x) \cdot e^{x^2}} = e^{x^2}$$

$$D'(x) \cdot e^{x^2} = e^{x^2}$$

$$D(x) = \int \frac{e^{x^2}}{e^{x^2}}\,dx = x$$

$$y_p = D(x) \cdot e^{x^2}$$

$$y_p = x \cdot e^{x^2}$$

$y(x) = y_p + y_h = x \cdot e^{x^2} + e^{x^2} D, \ D \in \mathbb{R}, x \in \mathbb{R}$

(2)

a) $y' = y^4 - y^3$

$y' = y^3(y-1)$

$\downarrow \qquad \downarrow$

$y = 0 \qquad y = 1$

$(0,-1) \to y' = 1 + 1 = 2$ (+)

$(0,\frac{1}{2}) \to y' = \frac{1}{32} - \frac{1}{16} \to$ (−)

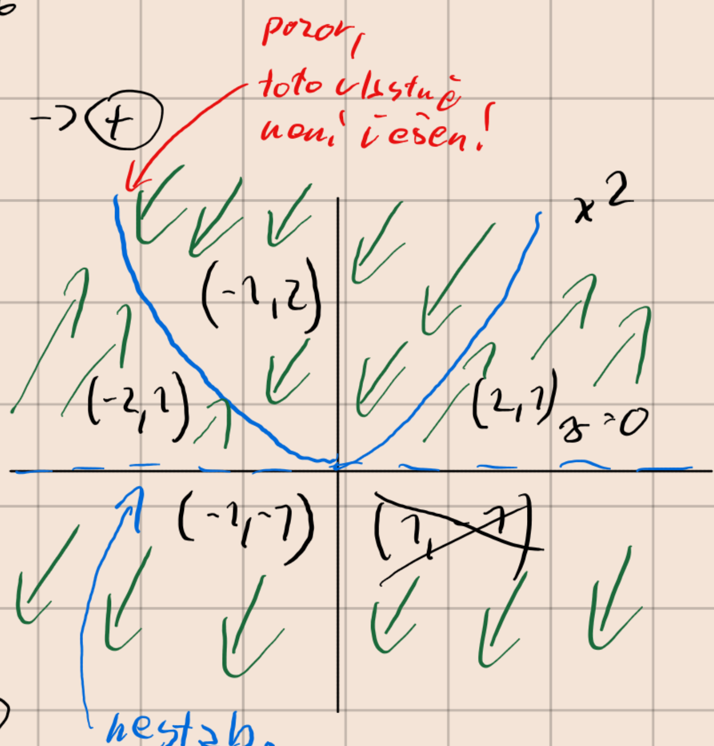
$(0,2) \to y' = 32 - 16 \to$ (+)

b) $y' = y(x^2 - y)$

$\downarrow \qquad \downarrow$

$y = 0 \qquad x^2 = y$

$y = x^2$



$(-1,-1)$ $y' = -1(1+1) \to$ (−)

~~$(1,-1)$~~ $y' = -(1+1) \to$ (−)

$(-2,1)$ $y' = 1(4-1) \to$ (+)

$(2,1)$ $y' = 1(4-1) \to$ (+)

$(-1,2)$ $y' = 2(1-2) \to$ (−)

[illegible]