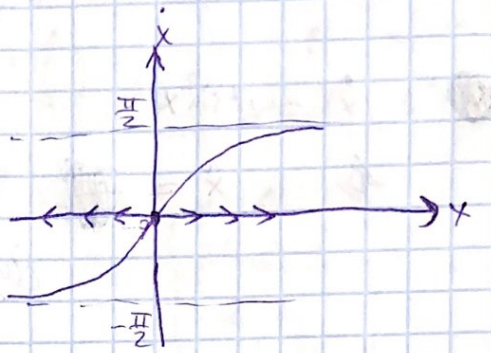
Третьяков А.-В. БО2-206.

№1.

1) $\dot{x} = \operatorname{arctg} x$

$x^* = 0$ - неуст. равн.

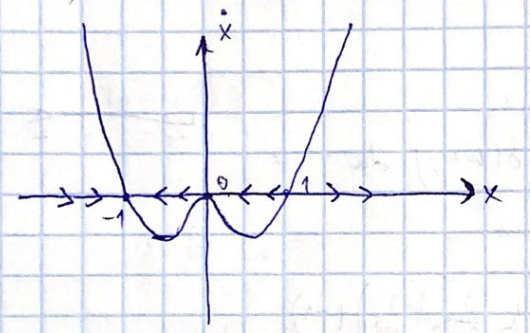


2) $\dot{x} = x^4 - x^2 = x^2(x^2-1) = x^2(x-1)(x+1)$

$x^* = -1$ ас. уст. равн.

$x^* = 0$ и → неуст. равн.

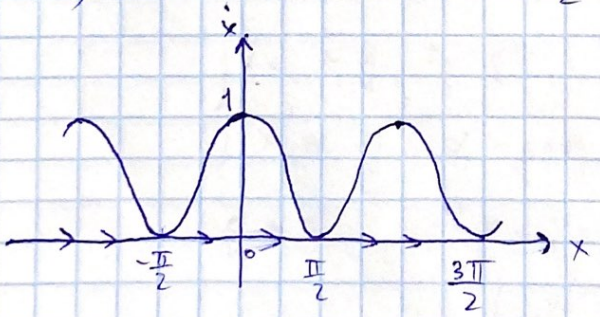
$x^* = 1$



3) $\dot{x} = \cos^2 x = \frac{1+\cos 2x}{2}$

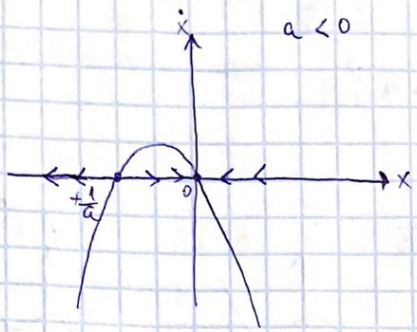
$x^* = \frac{\pi}{2} + \pi k, \quad k \in \mathbb{Z}$

неуст. равн.



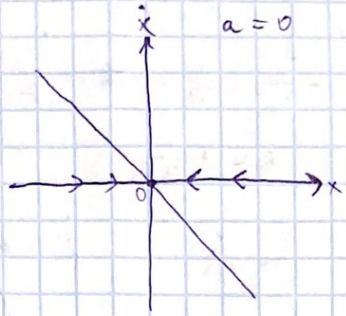
№2.

1) $\dot{x} = ax^2 - x = x(ax-1)$

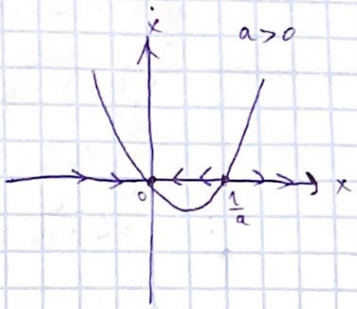


$x^* = +\frac{1}{a}$ неуст. равн.

$x^* = 0$ ас. уст. равн.



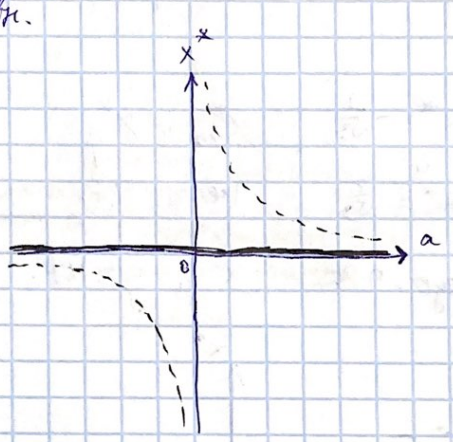
$x^* = 0$ ас. уст. равн.



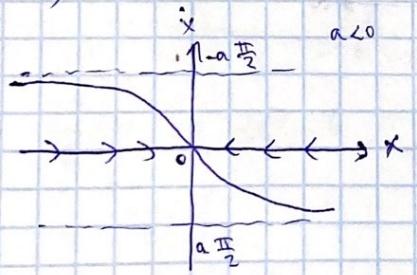
$x^* = 0$ ас. уст. равн.

$x^* = \frac{1}{a}$ неуст. равн.

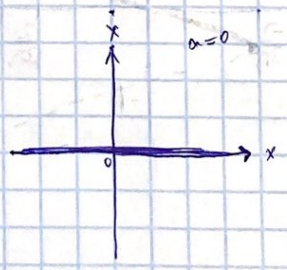
Бифр. диагр.



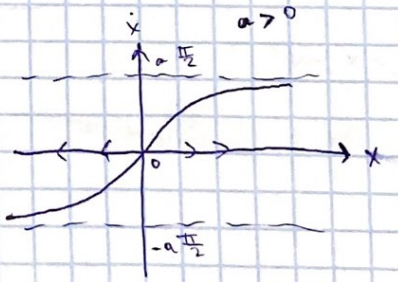
2) $\dot{x} = a \tan^{-1} x$



$x^* = 0$ ас. уст. равн.

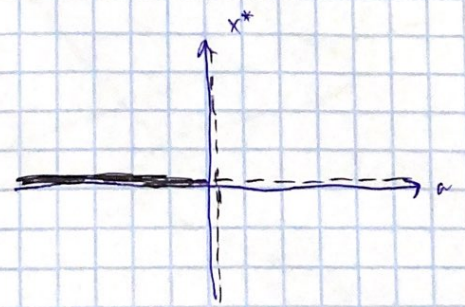


$x^* \in \mathbb{R}$



$x^* = 0$ неуст. равн.

Бифр. диагр.

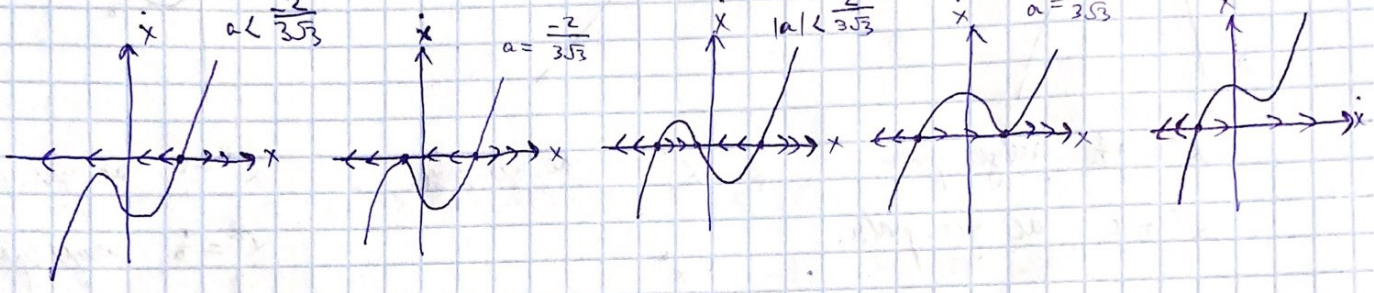


3) $\dot{x} = x^3 - x + a$

$y = x^3 - x + a$, $y' = 3x^2 - 1$, $x_{1,2} = \pm \frac{1}{\sqrt{3}}$

$y(x_1) \neq 0$ $\quad -\frac{1}{3\sqrt{3}} + \frac{1}{\sqrt{3}} + a \neq 0 \Rightarrow a \neq \frac{-2}{3\sqrt{3}}$

$y(x_2) = 0 \Rightarrow a = +\frac{2}{3\sqrt{3}}$



$x^* = \sqrt[3]{-\frac{a}{2} - \sqrt{\frac{-1}{27} + \frac{a^2}{4}}} + \sqrt[3]{-\frac{a}{2} + \sqrt{-\frac{1}{27} + \frac{a^2}{4}}}$

нет т. П.Р.

$x^* = -\frac{1}{\sqrt{3}}$, $x^u = \frac{2}{\sqrt{3}}$

нет т. П.Р.

$x^*_{л}$ и $x^*_{п}$.

нет т. П.Р.

$x^* = -\frac{2}{\sqrt{3}}$, $x^u = \frac{1}{\sqrt{3}}$

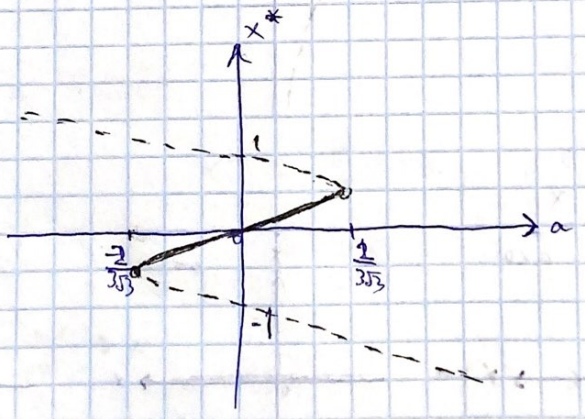
x^* гр. - уст. П.Р.

x^* нет т. П.Р.

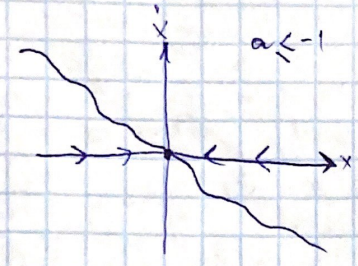
нет т. П.Р.

Бифф-диагр.:

$a = x - x^3$

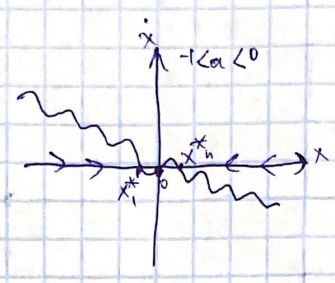


4) $\dot{x} = ax + \sin x$



$x^* = 0$

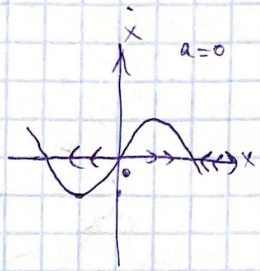
ас. уст. П.Р.



x^*_{2k-1} ас. уст.

x^*_{2k} неуст.

$x^* = 0$ неуст.

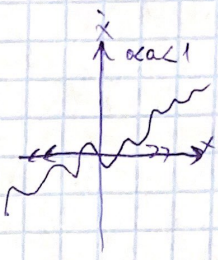


$x^* = 2\pi k$

неуст.

$x^* = (2k+1)\pi$

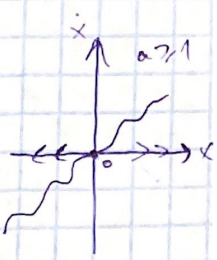
ас. уст.



x^*_{2k-1} неуст.

x^*_{2k} ас. уст.

$x^* = 0$ неуст.



$x^* = 0$ неуст.

Бифф. диагр.

$$a = -\frac{\sin x}{x}$$