Задача про мышку и кошку

1. $v = const$

$$|\bar{v}_c| = const = |\bar{v}_{0_c}|$$
$$|\bar{v}_m| = const = |\bar{v}_{0_m}|$$
$$\bar{v}_c = \frac{\bar{r}_m - \bar{r}_c}{|\bar{r}_m - \bar{r}_c|} * |\bar{v}_c|$$
$$\bar{v}_m = \frac{-\bar{r}_m}{|r_m|} * |\bar{v}_m|$$
$$\bar{r}_c = \bar{r}_{c_{prev}} + \bar{v}_c \Delta t$$
$$\bar{r}_m = \bar{r}_{m_{prev}} + \bar{v}_m \Delta t$$

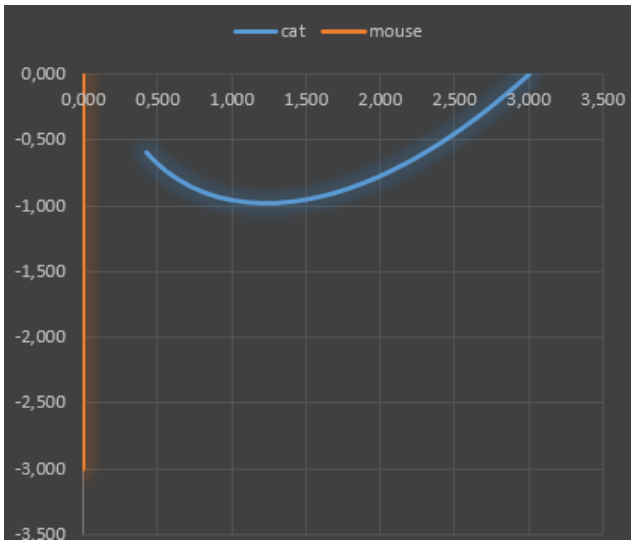
2. $v_c = const$

$$|\bar{a}| = k_1 \frac{\bar{r}_m - \bar{r}_c}{|\bar{r}_m - \bar{r}_c| * k_2};\ k_1, k_2 = const$$
$$|\bar{v}_c| = const = |\bar{v}_{0_c}|$$
$$\bar{v}_c = \frac{\bar{r}_m - \bar{r}_c}{|\bar{r}_m - \bar{r}_c|} * |\bar{v}_c|$$
$$\bar{v}_m = \frac{-\bar{r}_m}{|\bar{r}_m|} * |\bar{v}_{m_{prev}}| + \bar{a}$$
$$\bar{r}_c = \bar{r}_{c_{prev}} + \bar{v}_c \Delta t$$
$$\bar{r}_m = \bar{r}_{m_{prev}} + \bar{v}_m \Delta t$$

1.1.

$kill\_dist = 0.5$
$r_m = (0.0; -3.0)$
$r_c = (3.0; 0.0)$
$v_c = v_m = 1.0$
$\Delta t = 0.1$

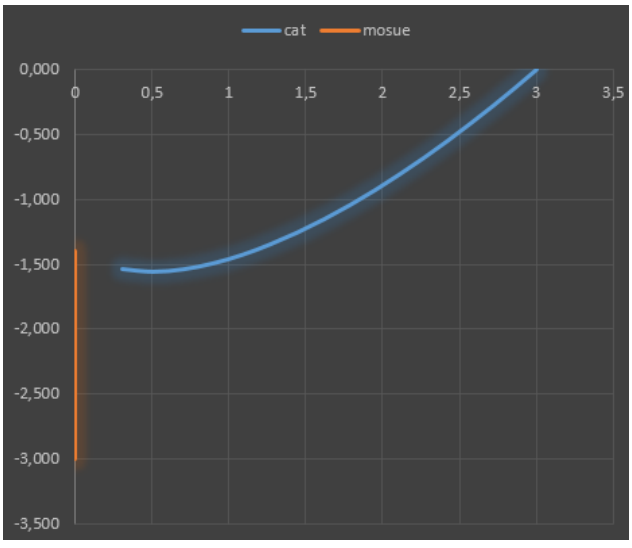
Мышка успела забежать в норку



1.2

$kill\_dist = 0.5$
$r_m = (0.0; -3.0)$
$r_c = (3.0; 0.0)$
$v_c = 2.0, v_m = 1.0$
$\Delta t = 0.1$

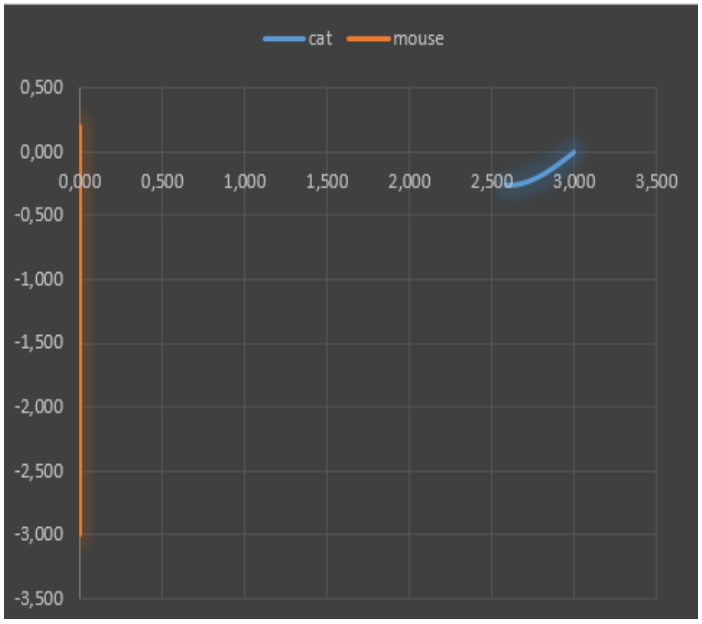
Кошка поймала мышку

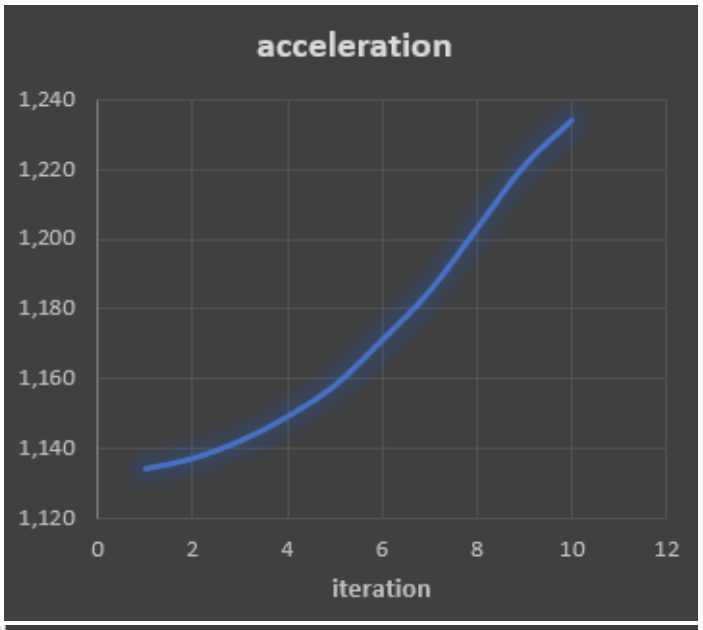


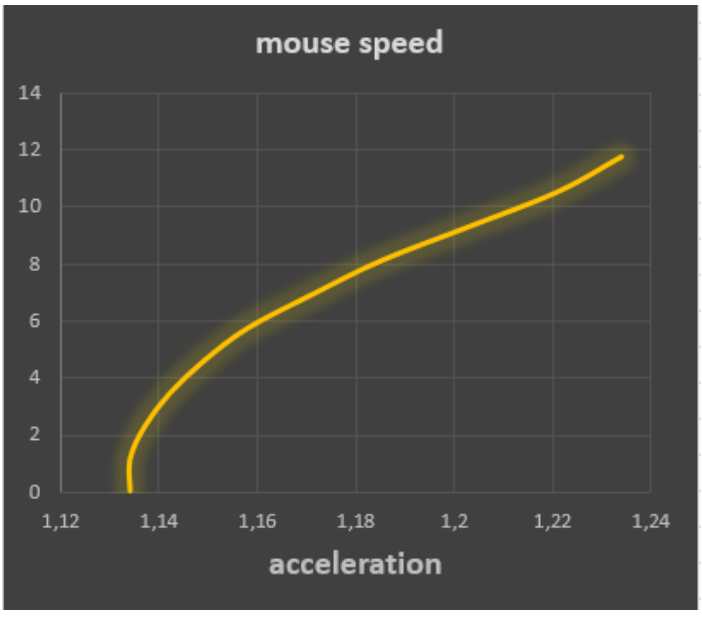
2.1

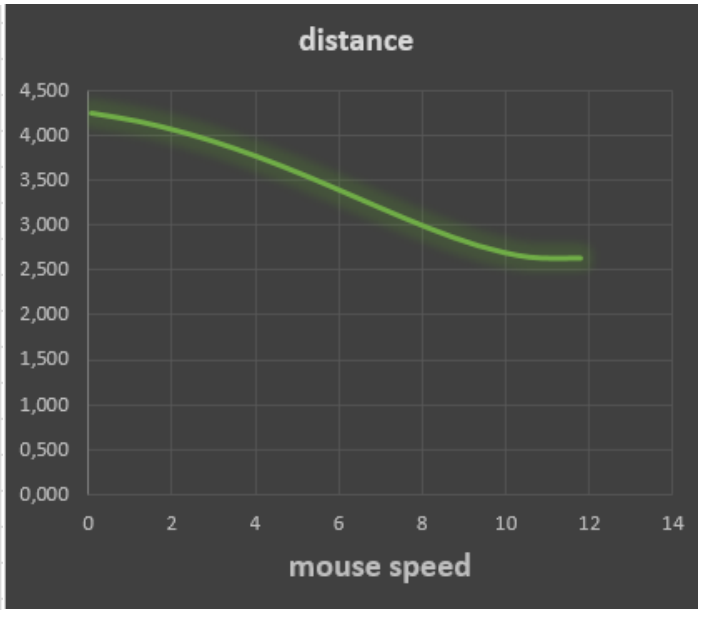
$kill\_dist = 0.5$
$r_m = (0.0; -3.0)$
$r_c = (3.0; 0.0)$
$v_c = 1.0, v_{0_m} = 0.0$
$k_1 = 1.0, k_2 = -0.5$
$\Delta t = 0.05$

Мышка успела забежать в норку









2.2

$kill\_dist = 0.05$
$r_m = (0.0; -15.0)$
$r_c = (1.0; 0.0)$
$v_c = 7.0, v_{0_m} = 0.0$
$k_1 = 0.01, k_2 = -0.5$
$\Delta t = 0.05$

Кошка поймала мышку