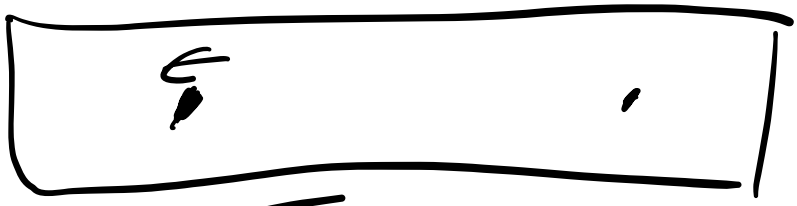
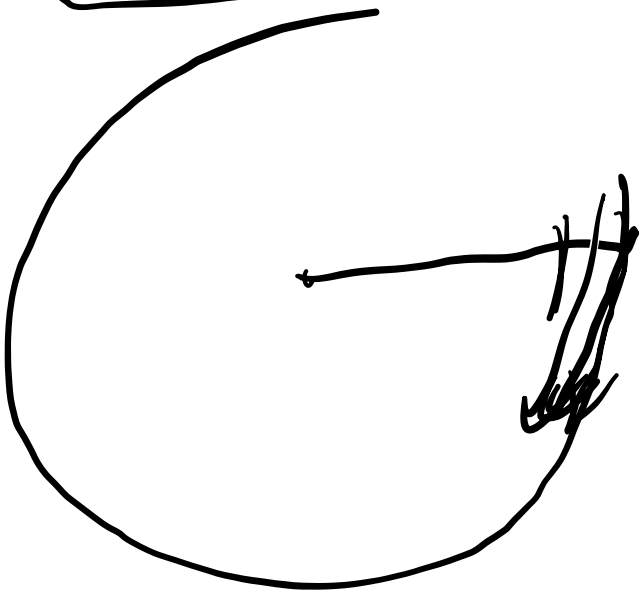
2024 国赛 A 题（详解+代码）





$v = 1$

$\left|\frac{ds}{dt}\right| = 1$

$r(\theta + 2\pi) - r(\theta) = d$

$r \sim k\theta$

$k \cdot 2\pi = d$

$\sim k = \frac{d}{2\pi}$ ✓

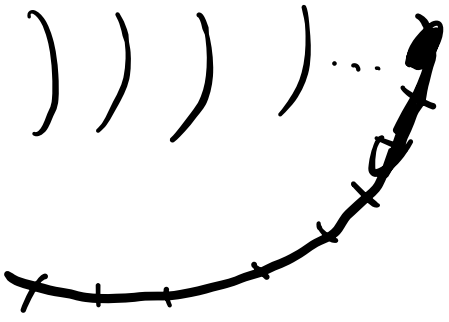
$ds = \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2}\, d\theta$

$r = k \cdot \theta$

$= \sqrt{k^2\theta^2 + k^2}\, d\theta$

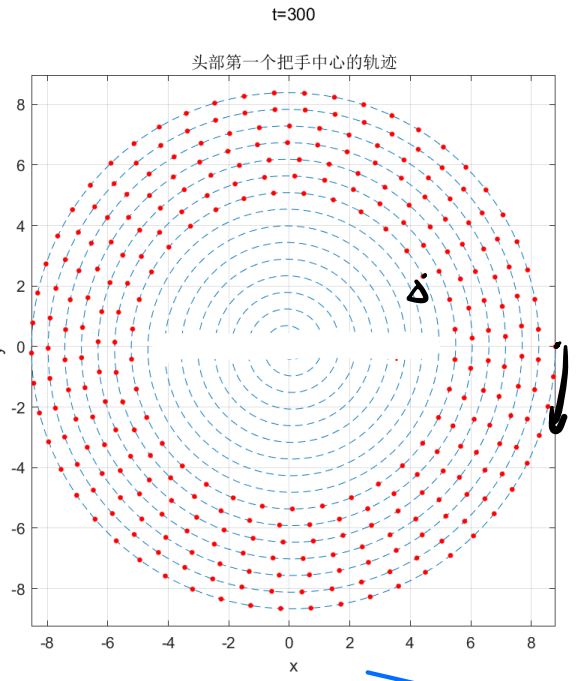
$k\sqrt{1+\theta^2}\, d\theta$

$\frac{ds}{dt} = k\sqrt{1+\theta^2}\frac{d\theta}{dt} = 1$



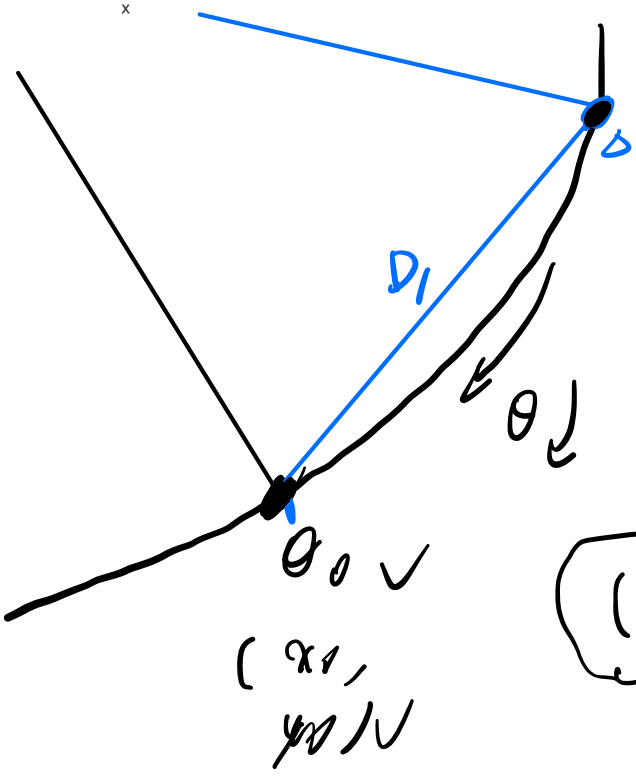
$\Leftrightarrow \frac{d\theta}{dt} \sim \frac{-1}{k\sqrt{1+\theta^2}}$ ✓

$\theta(0) = 32\pi$



D_1 |

38



$r_1 = k \cdot \theta_1$

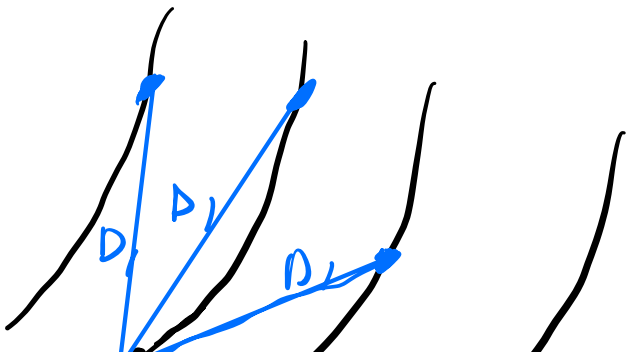
$x_1 = r_1 \cos\theta_1$

$y_1 = r_1 \sin\theta_1$

(x_1, y_1)

$(x_1 - x_0)^2 + (y_1 - y_0)^2 = D_1^2$

$f(\theta_1) - D_1 = 0$

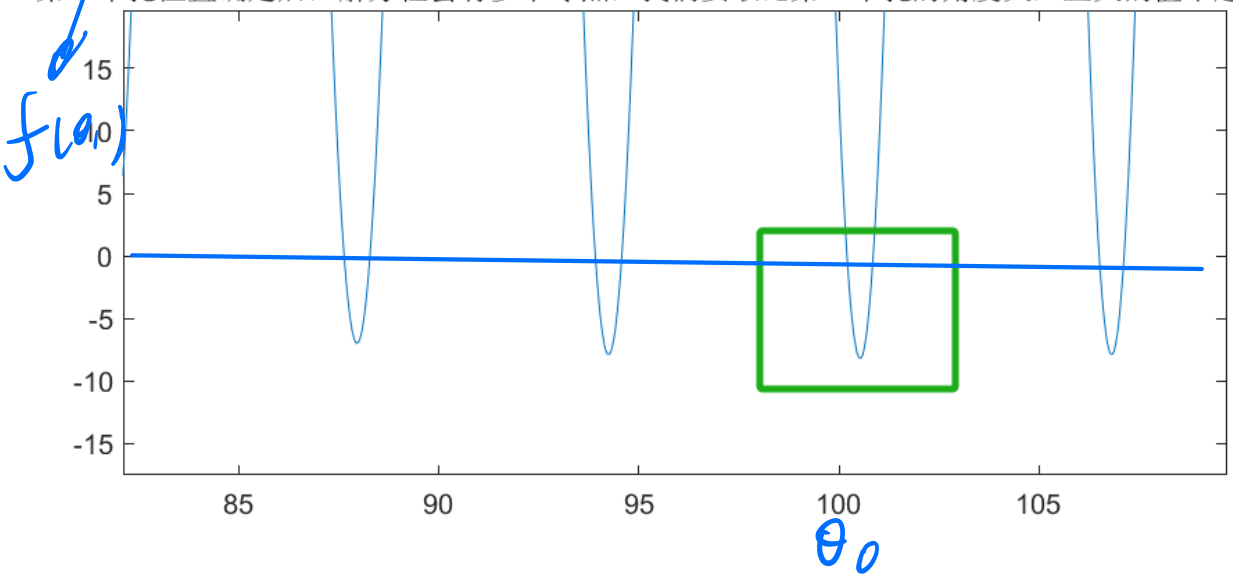


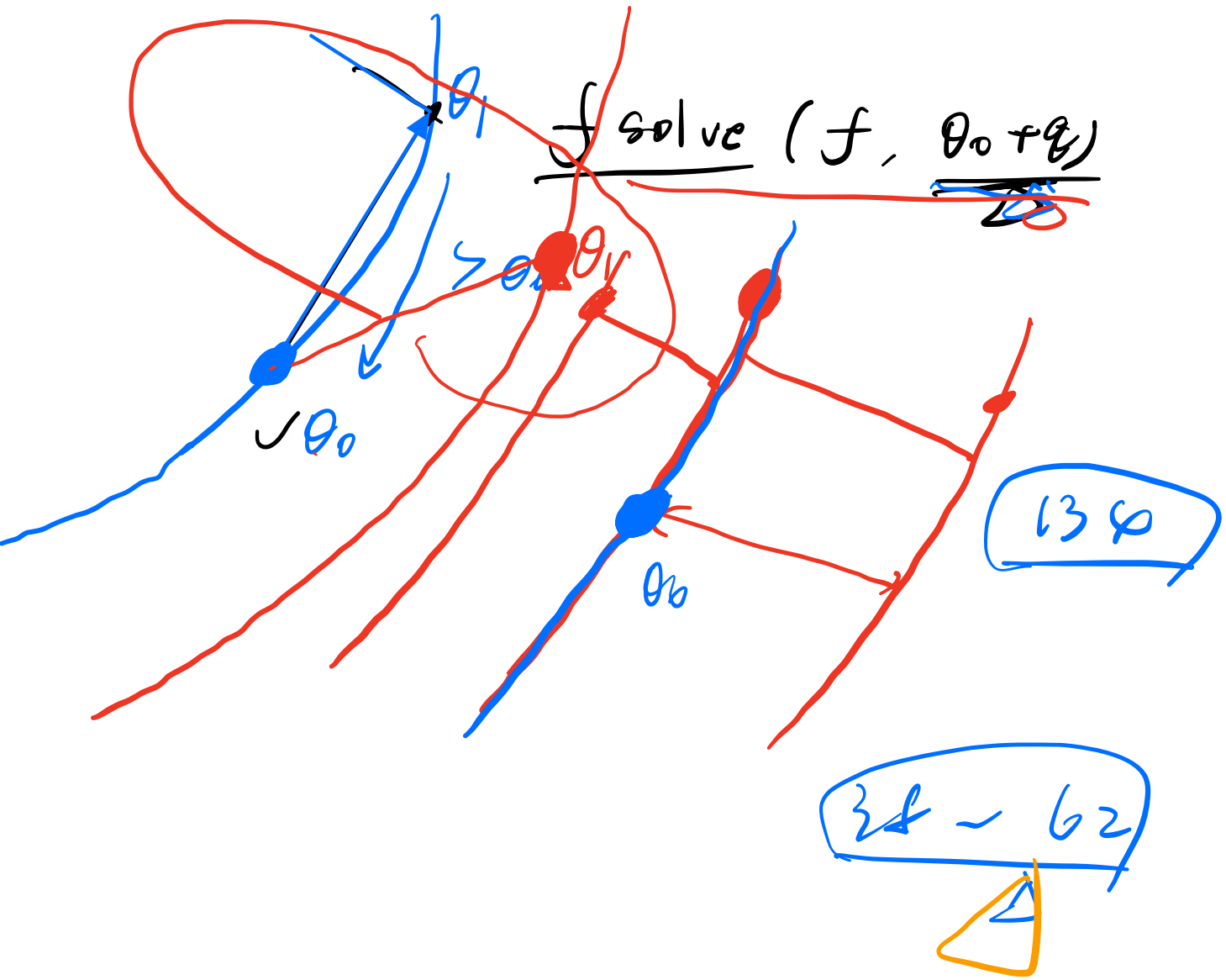
$\Rightarrow \theta_1$ 多项式

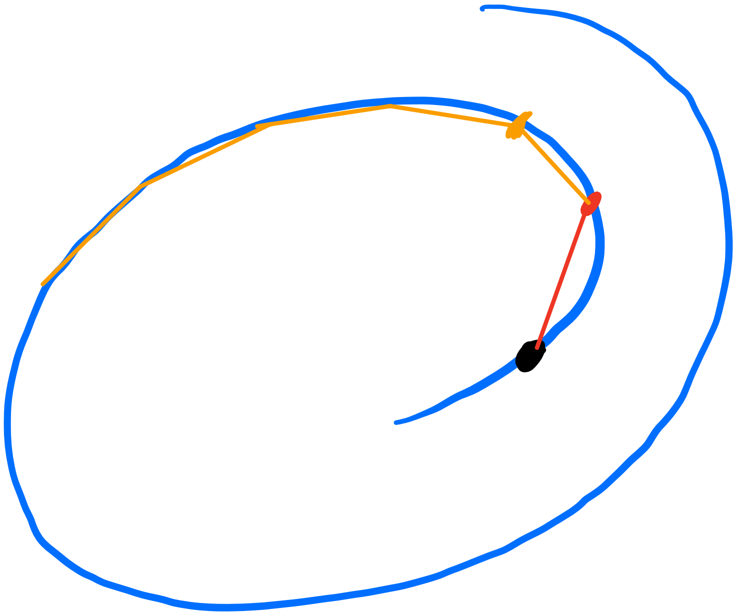
第1

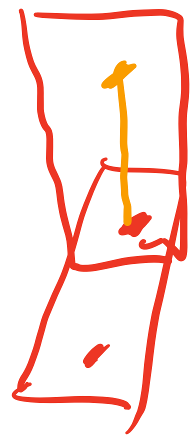
code2. 127

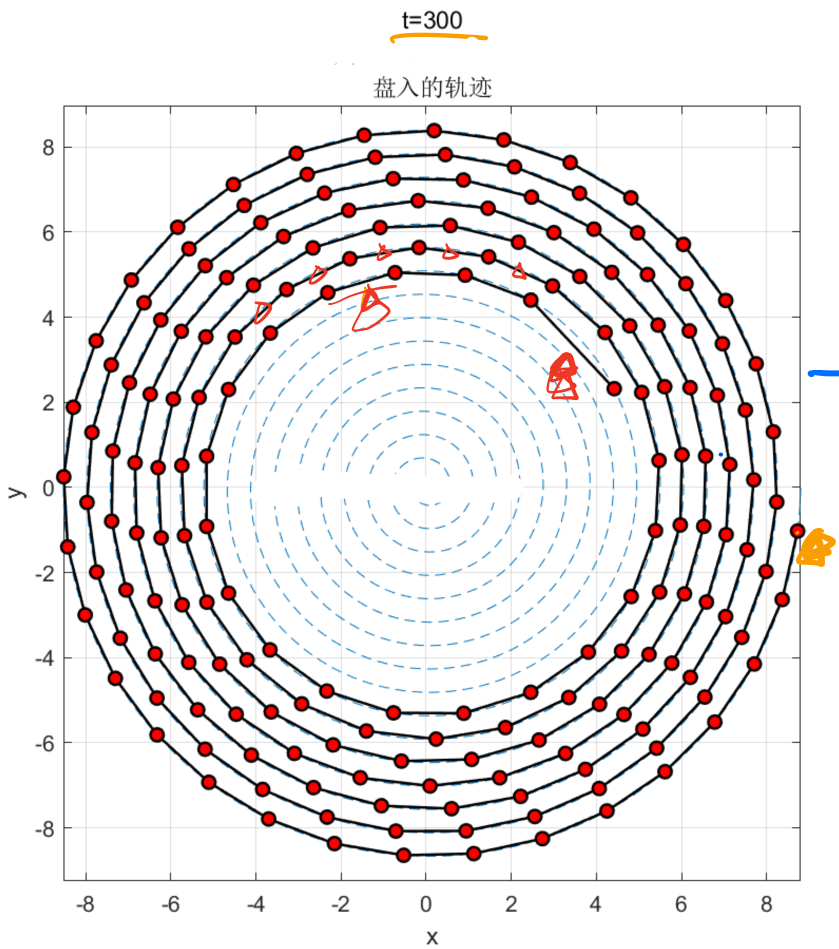
第一个孔位置确定后，解方程会有多个零点，我们要取比第一个孔的角度大，且大的值不超过2pi







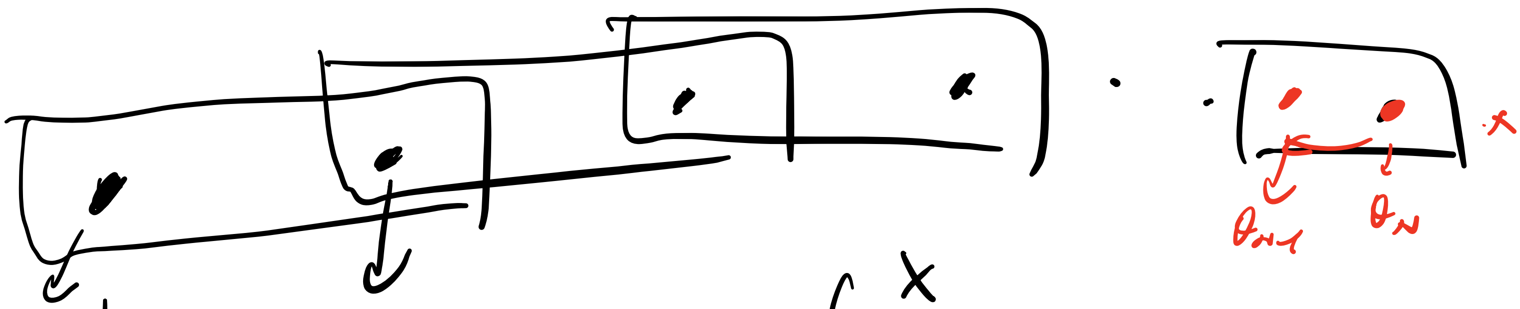




最危险点

26-107 code2

$$v = -k\cdot\sqrt{1+\theta^2}\,\frac{d\theta}{dt}$$



$$\frac{\theta_N-\theta_{N-1}}{\Delta t}$$

t_{i-1} θ_{i-1}

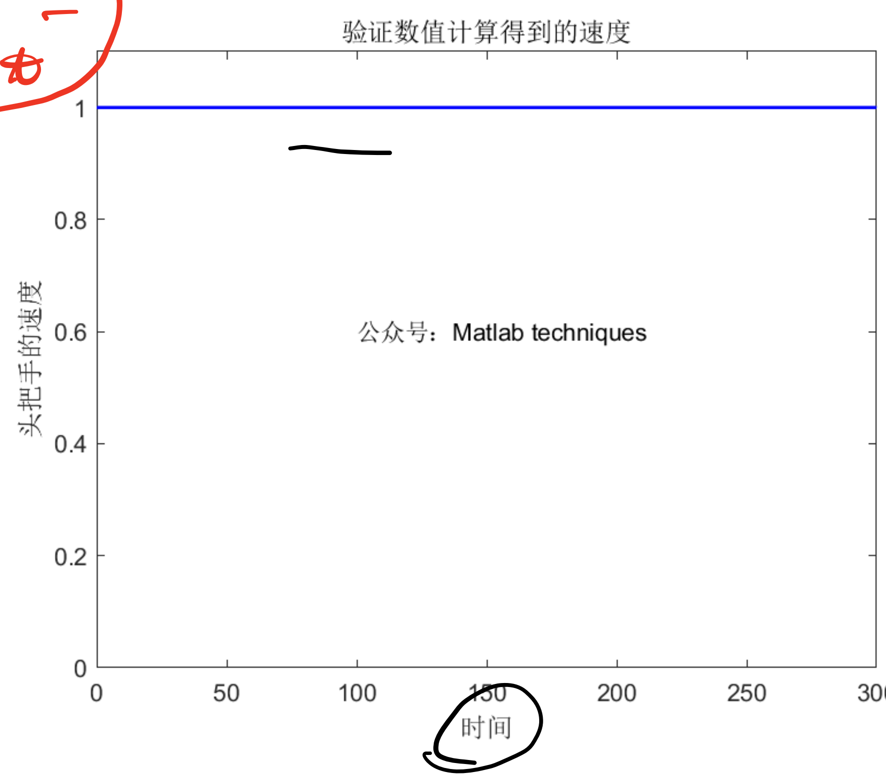
t_i θ_i

t_{i+1} θ_{i+1}

$$\frac{\theta_{i+1}-\theta_{i-1}}{2\Delta}$$

{ x, y, Theta

$\frac{d\theta}{dt}\Big|_{t_i}$ 中心差分法 θ



θ

$\theta(t)$

θ_i θ_{i+1}

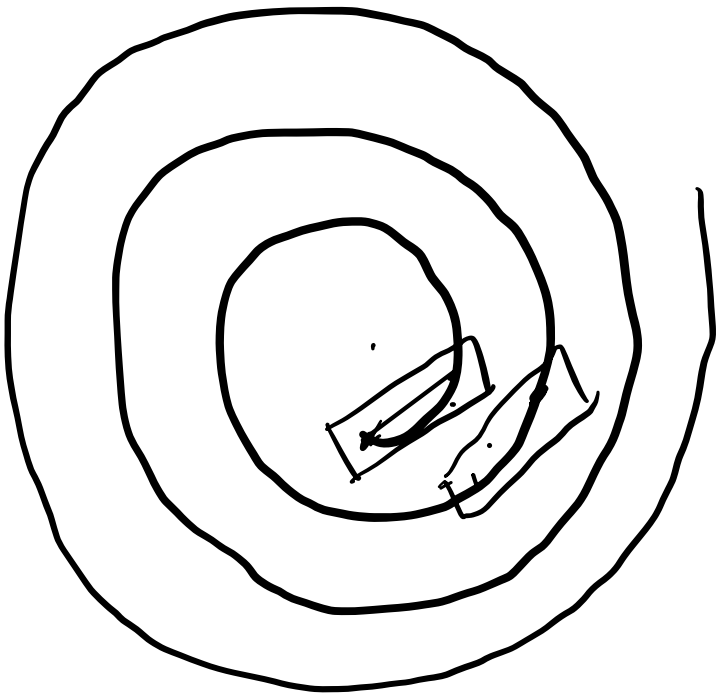
t_i t_{i+1}

t_0 $\delta\theta$ t_1

$\overline{dt}$

	JX	JY	JZ	KA	KB	KC	KD	KE	KF	KG	KH	KI	KJ	KK	KL	KM	KN	KO	KP
s	282 s	283 s	284 s	285 s	286 s	287 s	288 s	289 s	290 s	291 s	292 s	293 s	294 s	295 s	296 s	297 s	298 s	299 s	300 s
54	-3.5382	-4.203	-4.7157	-5.0574	-5.2153	-5.1829	-4.9609	-4.5569	-3.9852	-3.2667	-2.4279	-1.5001	-0.5183	0.47998	1.45633	2.37274	3.19317	3.88497	4.42027
1	-3.944	-3.199	-2.3422	-1.404	-0.418	0.57992	1.55339	2.46645	3.28505	3.97832	4.51982	4.88858	5.06999	5.05649	4.84794	4.45179	3.88291	3.16311	2.32043
29	-0.9952	-1.9497	-2.833	-3.6136	-4.2635	-4.7592	-5.0824	-5.2208	-5.1688	-4.9278	-4.506	-3.9185	-3.1866	-2.3375	-1.4029	-0.418	0.57959	1.55136	2.45949
25	-5.2527	-4.9603	-4.495	-3.8727	-3.115	-2.2485	-1.304	-0.3154	0.68144	1.65011	2.55481	3.36177	4.04057	4.56529	4.91557	5.07752	5.0443	4.81655	4.40248
55	0.65284	-0.3454	-1.3285	-2.2623	-3.1137	-3.8524	-4.4518	-4.8901	-5.151	-5.2245	-5.1073	-4.803	-4.3225	-3.6829	-2.9076	-2.0255	-1.0696	-0.0761	0.91688
55	-5.3334	-5.3457	-5.1726	-4.8195	-4.2984	-3.627	-2.8288	-1.932	-0.9685	0.027	1.01826	1.96893	2.84377	3.61003	4.2387	4.70566	4.99269	5.08824	4.98802
02	2.24763	1.30018	0.31097	-0.6859	-1.6559	-2.565	-3.381	-4.0747	-4.6211	-5.0001	-5.1976	-5.2058	-5.0237	-4.6576	-4.1204	-3.4315	-2.6162	-1.705	-0.7321
56	-4.9101	-5.2245	-5.3586	-5.3071	-5.0714	-4.659	-4.0841	-3.3664	-2.5311	-1.6077	-0.6293	0.36883	1.3502	2.27872	3.11987	3.84203	4.41776	4.82485	5.0473
76	3.64013	2.8317	1.92946	0.96399	-0.0317	-1.0232	-1.976	-2.8567	-3.6338	-4.2796	-4.7706	-5.0887	-5.2219	-5.1647	-4.9186	-4.4921	-3.9005	-3.1653	-2.3136
12	-4.025	-4.6106	-5.0377	-5.2912	-5.3619	-5.2									1.67581	2.57813	3.38188	4.05675	4.57695
44	4.70221	4.10694	3.37522	2.53141	1.60395	0.62									-5.2238	-5.1014	-4.7923	-4.3073	-3.6639
58	-2.7622	-3.5635	-4.2425	-4.7757	-5.1447	-5.336									0.05428	1.04475	1.99367	2.86586	3.62867
14	5.33798	5.00937	4.51477	3.87027	3.09719				138	-1.6824	-2.5892	-3.402	-4.0919	-4.6338	-5.008	-5.2003	-5.2033	-5.0163	-4.6455
31	-1.2396	-2.1822	-3.0492	-3.8114	-4.4428	-4.92			.303	-5.0622	-4.6451	-4.066	-3.3448	-2.5067	-1.5815	-0.6023	0.39567	1.37593	2.3024
37	5.49163	5.45823	5.24476	4.85777	4.30971	3.61852	2.80714	1.9028	0.93615	-0.0597	-1.0505	-2.0016	-2.8796	-3.6534	-4.2952	-4.7816	-5.0948	-5.2229	-5.1606
45	0.40319	-0.5944	-1.5695	-2.4895	-3.3237	-4.0438	-4.625	-5.0473	-5.2957	-5.3612	-5.2409	-4.9386	-4.4642	-3.8339	-3.0696	-2.1983	-1.2508	-0.2611	0.73486
48	5.15161	5.41503	5.50063	5.40511	5.13112	4.68725	4.08787	3.3527	2.50625	1.57701	0.59658	-0.4014	-1.3824	-2.3121	-3.1578	-3.8892	-4.4802	-4.909	-5.1598
54	2.01778	1.05502	0.06057	-0.933	-1.8927	-2.7867	-3.5847	-4.2597	-4.7885	-5.1526	-5.339	-5.3409	-5.1575	-4.7948	-4.2649	-3.5861	-2.782	-1.881	-0.9151
09	4.35052	4.88591	5.26153	5.4647	5.48828	5.33098	4.9975	4.49846	3.85011	3.07388	2.19572	1.24531	0.25506	-0.741	-1.7081	-2.6126	-3.4223	-4.1084	-4.646
31	3.46026	2.61789	1.69316	0.71597	-0.2818	-1.2674	-2.2081	-3.0724	-3.8311	-4.4584	-4.9325	-5.2369	-5.3606	-5.2988	-5.0531	-4.6315	-4.0483	-3.3237	-2.4831
05	3.16125	3.92016	4.55113	5.03347	5.3511	5.4932	5.45462	5.23612	4.84444	4.29217	3.59739	2.78316	1.8768	0.90905	-0.087	-1.077	-2.0264	-2.9019	-3.6723
82	4.604	3.95572	3.1824	2.30862	1.36246	0.37459	-0.6227	-1.5965	-2.5144	-3.3456	-4.062	-4.639	-5.0565	-5.3	-5.3604	-5.2351	-4.928	-4.4492	-3.8152
42	1.68966	2.60475	3.43447	4.15207	4.73416	5.16156	5.41996	5.50042	5.3998	5.12092	4.67254	4.06919	3.33071	2.48171	1.55079	0.56958	-0.4282	-1.4081	-2.3359
24	5.35026	4.95182	4.39713	3.70348	2.89278	1.99092	1.02696	0.03222	-0.9607	-1.9188	-2.8104	-3.6052	-4.2764	-4.8007	-5.1601	-5.3415	-5.3383	-5.1501	-4.7828
16	0.06461	1.05598	2.01133	2.90029	3.69439	4.36794	4.89891	5.26972	5.46785	5.48632	5.32402	4.98582	4.48248	3.8304	3.05114	2.17075	1.21898	0.22829	-0.7672
69	5.63613	5.52087	5.23209	4.77845	4.17395	3.43752	2.59253	1.66602	0.68794	-0.3098	-1.2944	-2.2333	-3.0949	-3.8502	-4.4734	-4.9431	-5.2426	-5.3614	-5.2946
96	-1.5736	-0.5913	0.40673	1.38919	2.32508	3.18456	3.94003	4.56695	5.04475	5.35752	5.49459	5.45097	5.22759	4.83136	4.27501	3.57676	2.7598	1.85153	0.88274
28	5.4391	5.61564	5.61647	5.44108	5.09453	4.58736	3.9353	3.15887	2.28277	1.33515	0.34673	-0.6502	-1.6227	-2.5385	-3.3668	-4.0796	-4.6524	-5.0654	-5.304
25	-3.0854	-2.1956	-1.2404	-0.2493	0.7469	1.7168	2.62972	3.45649	4.17045	4.74834	5.17113	5.42462	5.50007	5.3945	5.11088	4.65814	4.05095	3.30928	2.45785

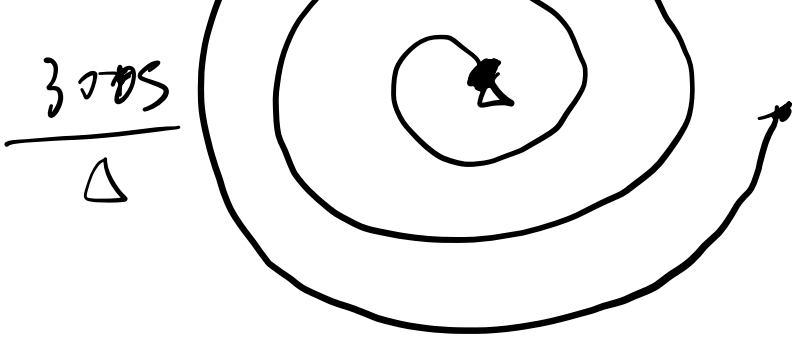
题量A型（二）



重

0 - 300 s

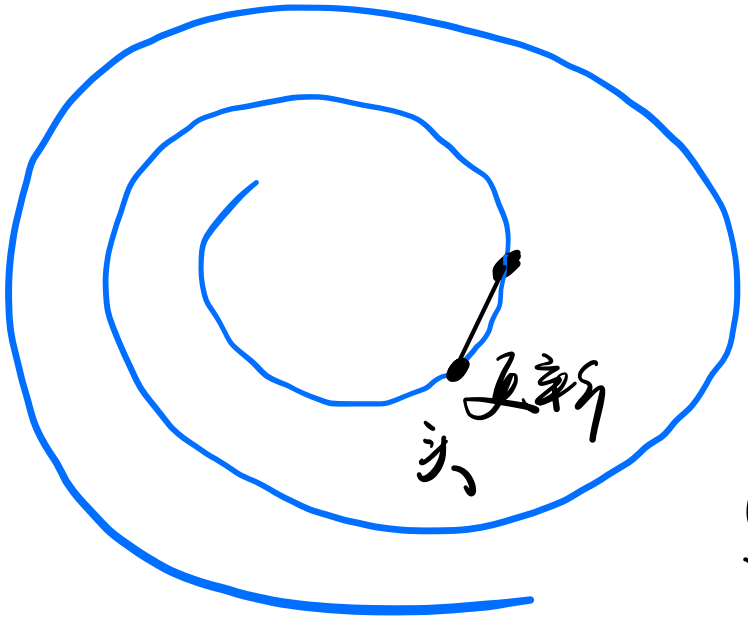
5



$\{ x_0, y_0, \theta_0$

$step = \begin{cases} 0.1\,s \\ 0.2\,s \end{cases}$

Code 2. 27

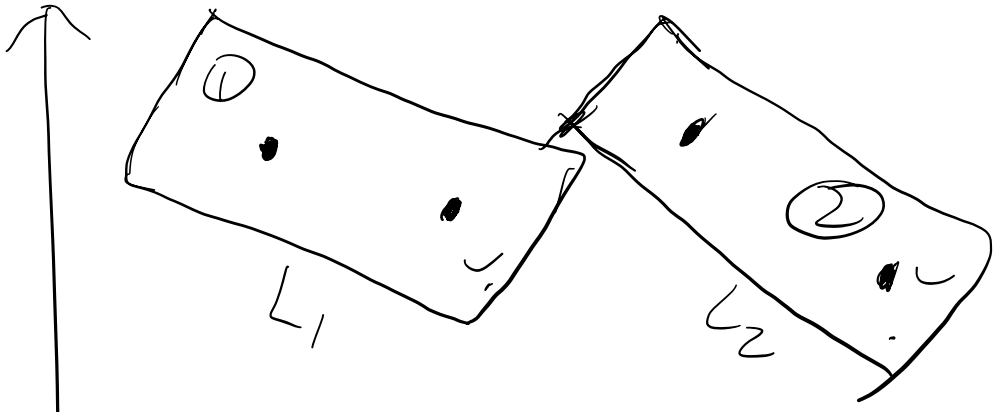


Odometry

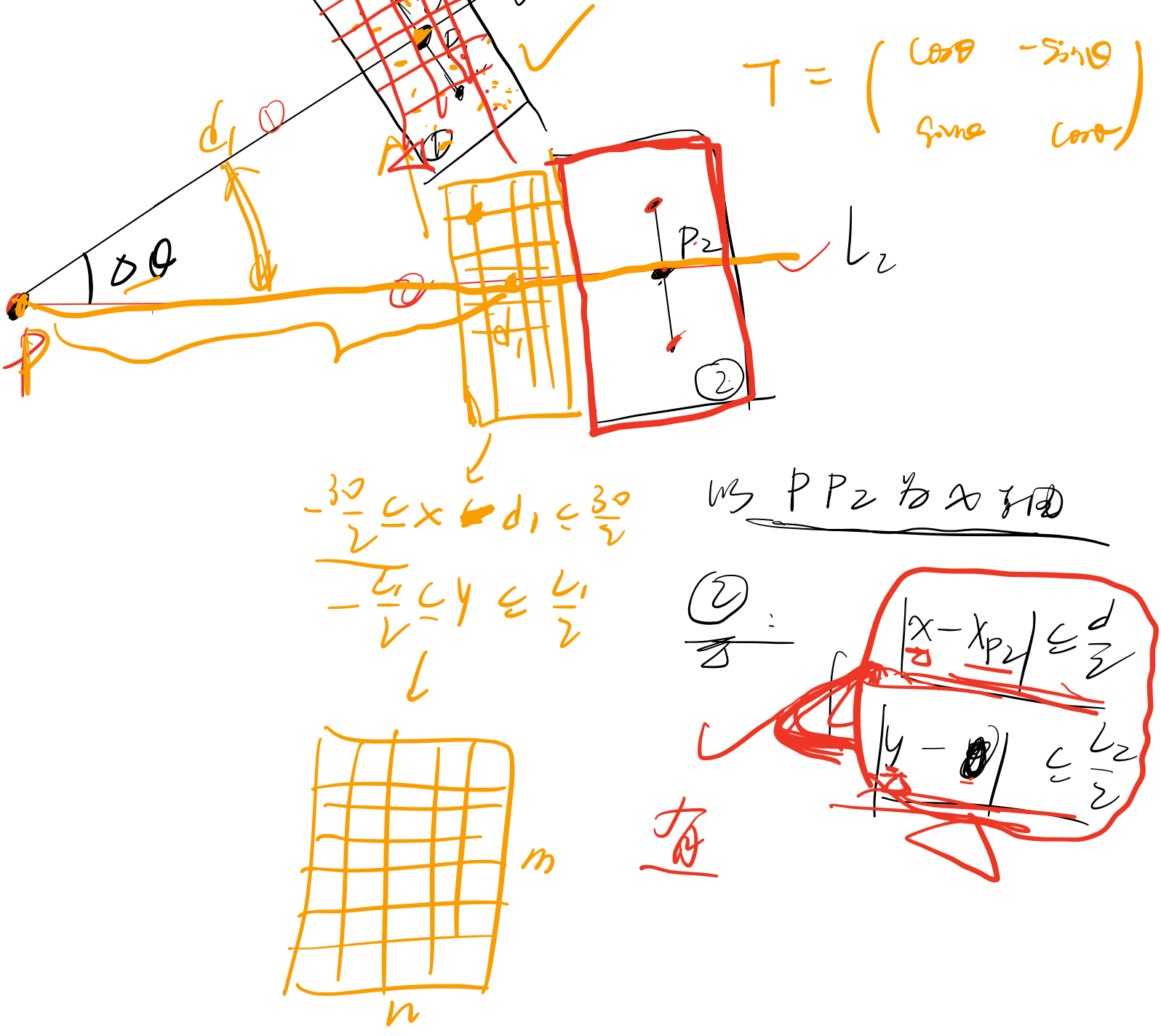
$\frac{ds}{dt} = 1$ 43

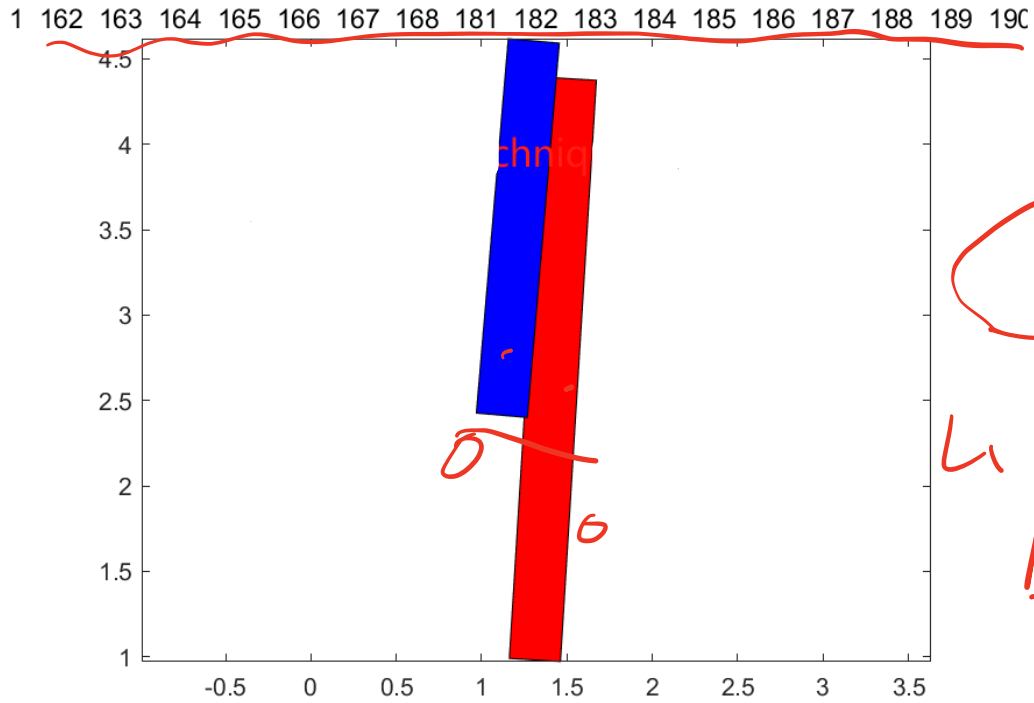
$[3.0 \quad 3.0 + step]$

$[0 \quad step]$

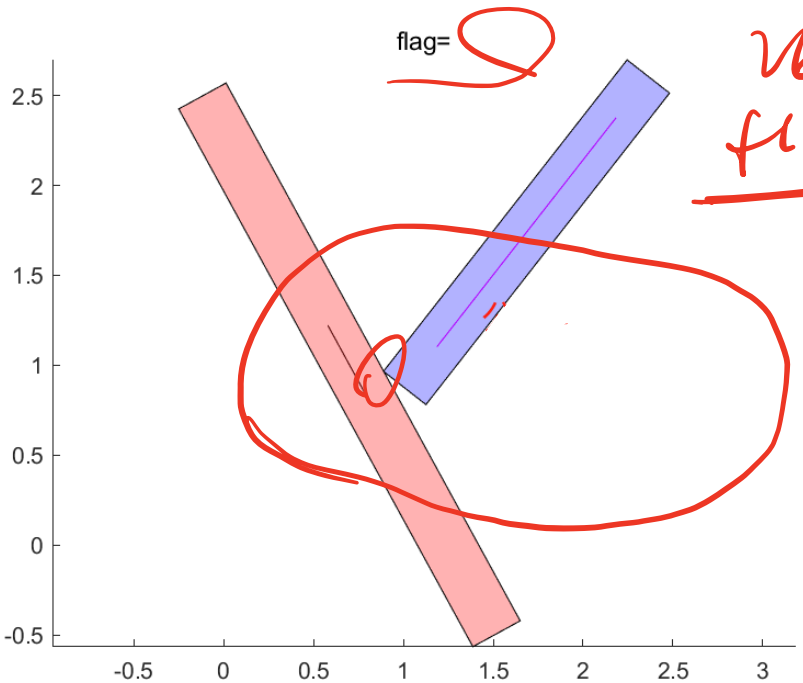


2021 2023

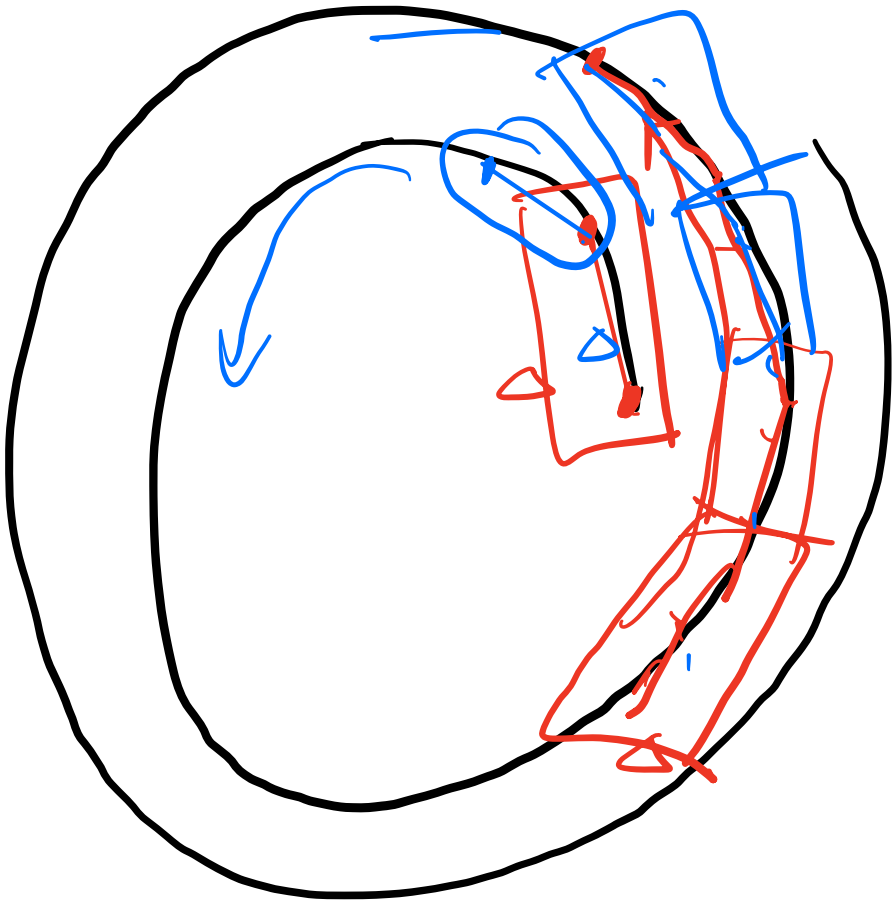

$T = \begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}$
d_1
①
$\Delta\theta$
P_2
L_2
②
$-\frac{30}{2} \le x - d_1 \le \frac{30}{2}$
$-\frac{L_1}{2} \le y \le \frac{L_1}{2}$
m
n
$P P_2$ 为 x 轴
②：
$|x - x_{P_2}| \le \frac{d}{2}$
$|y - 0| \le \frac{L_2}{2}$
在

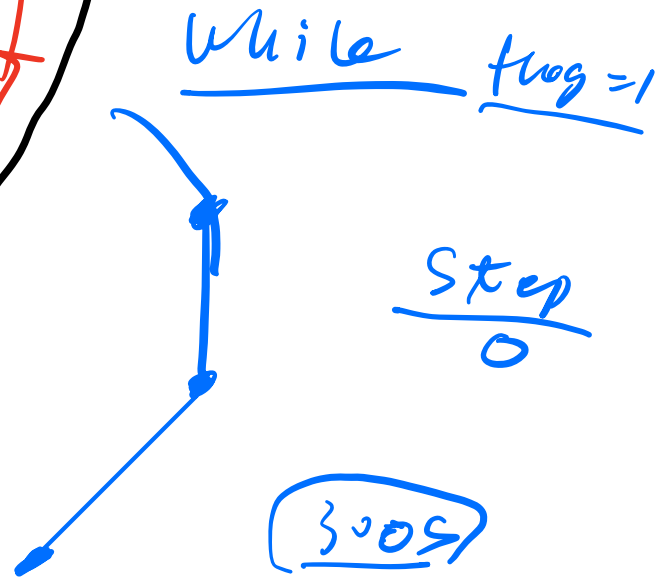


find - if - intersect



flag




while
flag=1
Step
0
Boss