Движение точки в плоскости

Точка движется по закону $x = x(t), y = y(t)$. Для момента времени $t = t_1$ найти скорость, ускорение точки и радиус кривизны траектории (x и y даны в см, t_1 — в с).

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Вариант 1
$x = 6e^{-5t}$,
$y = 18\sqrt{1 - e^{-10t}}$,
$t_1 = 0.06$.

Вариант 2
$x = 700/(t + 8)$,
$y = (t - 3500)/(t + 8)^2$,
$t_1 = 4$.

Вариант 3
$x = \frac{1}{8}\left(\frac{66}{\sin(2t)+2} + 1\right)$,
$y = 8\sin(2t)$,
$t_1 = 7\pi/6$.

Вариант 4
$x = 3 + 6\cos(t)$,
$y = 3\,\mathrm{tg}\,(t) + 6\sin t$,
$t_1 = \pi/3$.

Вариант 5
$x = 1600/(t + 8)$,
$y = (t - 17600)/(t + 8)^2$,
$t_1 = 10$.

Вариант 6
$x = 3\sin(2t)$,
$y = -0.3(9 + \cos^2(2t))\sin(2t)$,
$t_1 = 5\pi/6$.

Вариант 7
$x = 2\sin(4t)$,
$y = 3 + 5\cos(8t)$,
$t_1 = 5\pi/24$.

Вариант 8
$x = 9e^{t/9}$,
$y = 9e^{t/9}(0.1e^{2t/9} - 1)$,
$t_1 = 8$.

Вариант 9
$x = 4\sin(4t)$,
$y = 5 + 5\cos(8t)$,
$t_1 = 11\pi/24$.

Вариант 10
$x = \frac{1}{2}(4/(e^{2t} + 1) + 1)$,
$y = e^{2t}$,
$t_1 = 0.08$.

Вариант 11
$x = 4\sin(2t)$,
$y = 5 + 3\cos(4t)$,
$t_1 = \pi/12$.

Вариант 12
$x = 10(4t - \sin(4t))$,
$y = 10(1 - \cos(4t))$,
$t_1 = 7\pi/24$.

Вариант 13
$x = \frac{9(t^2 - 1)}{1 + t^2}$,
$y = \frac{9(t^2 - 1)t}{1 + t^2}$,
$t_1 = 1$.

Вариант 14
$x = 11t^2/(1 + t^2)$,
$y = 11t^3/(1 + t^2)$,
$t_1 = 4$.

Вариант 15
$x = \frac{1}{2}(6/(e^{3t} + 1) + 1)$,
$y = e^{3t}$,
$t_1 = 0.07$.

Вариант 16
$x = 4e^{-2t}$,
$y = 12\sqrt{1 - e^{-4t}}$,
$t_1 = 0.09$.

Вариант 17
$x = \frac{1}{6}(12/(e^{2t} + 1) + 1)$,
$y = e^{2t}$,
$t_1 = 0.03$.

Вариант 18
$x = 11\cos(24t)$,
$y = 5\sin^2(12t)$,
$t_1 = 5\pi/33$.

Вариант 19 $x = 11\cos(8t)(1 + \cos(8t))$, $y = 11\sin(8t)(1 + \cos(8t))$, $t_1 = 7\pi/48$.	**Вариант 20** $x = 27t/(1 + t^3)$, $y = 27t^2/(1 + t^3)$, $t_1 = 0.4$.
Вариант 21 $x = 2\sin(3t)$, $y = 3 + 4\cos(6t)$, $t_1 = \pi/18$.	**Вариант 22** $x = 900/(t + 8)$, $y = (t - 4900)/(t + 8)^2$, $t_1 = 5$.
Вариант 23 $x = 36t/(1 + t^3)$, $y = 36t^2/(1 + t^3)$, $t_1 = 0.1$.	**Вариант 24** $x = 15t/(1 + t^3)$, $y = 15t^2/(1 + t^3)$, $t_1 = 0.3$.
Вариант 25 $x = 8 + 4\cos(t)$, $y = 8\,\text{tg}\,(t) + 4\sin t$, $t_1 = 5\pi/18$.	**Вариант 26** $x = 4(2t - \sin(2t))$, $y = 4(1 - \cos(2t))$, $t_1 = 11\pi/12$.
Вариант 27 $x = 4\sin(4t)$, $y = -0.4(9 + \cos^2(4t))\sin(4t)$, $t_1 = 7\pi/24$.	**Вариант 28** $x = 6e^{t/6}$, $y = 6e^{t/6}(0.1e^{t/3} - 1)$, $t_1 = 9$.
Вариант 29 $x = 8e^{t/8}$, $y = 8e^{t/8}(0.1e^{t/4} - 1)$, $t_1 = 4$.	**Вариант 30** $x = 11e^{-5t}$, $y = 33\sqrt{1 - e^{-10t}}$, $t_1 = 0.09$.

Ответы

	v_x	v_y	v	W_x	W_y	W	W_τ	W_n	R
		sm/s				sm/s^2			sm
1	-22.22	73.53	76.82	111.12	-1182.56	1187.77	-1164.14	235.76	25.03
2	-4.86	4.05	6.33	0.81	-1.01	1.30	-1.27	0.26	154.15
3	-1.00	8.00	8.06	4.18	-27.71	28.03	-28.02	0.70	93.48
4	-5.20	15.00	15.87	-3.00	36.37	36.50	35.35	9.07	27.78
5	-4.94	6.04	7.80	0.55	-1.01	1.15	-1.13	0.21	286.26
6	3.00	-2.33	3.80	10.39	-9.61	14.16	14.10	1.23	11.69
7	-6.93	34.64	35.33	-16.00	-160.00	160.80	-153.76	47.07	26.51
8	2.43	1.89	3.08	0.27	1.17	1.20	0.93	0.76	12.49
9	13.86	34.64	37.31	32.00	-160.00	163.17	-136.67	89.13	15.62
10	-0.99	2.35	2.55	0.16	4.69	4.70	4.26	1.98	3.29
11	6.93	-10.39	12.49	-8.00	-24.00	25.30	15.53	19.97	7.81
12	74.64	-20.00	77.27	-80.00	-138.56	160.00	-41.41	154.55	38.64
13	9.00	9.00	12.73	-9.00	9.00	12.73	0.00	12.73	12.73
14	0.30	11.57	11.57	-0.21	-0.23	0.31	-0.24	0.20	655.91
15	-2.23	3.70	4.32	0.70	11.10	11.13	9.16	6.32	2.95
16	-6.68	30.45	31.18	13.36	-262.37	262.71	-259.13	43.18	22.51
17	-1.00	2.12	2.35	0.06	4.25	4.25	3.82	1.86	2.96
18	240.14	-54.58	246.27	-2632.07	598.20	2699.19	-2699.19	0.00	13523835.80
19	-32.21	-32.21	45.55	-94.32	-867.36	872.48	680.01	546.63	3.80
20	20.80	18.47	27.81	-41.66	24.93	48.55	-14.60	46.30	16.71
21	5.20	-20.78	21.42	-9.00	-72.00	72.56	67.67	26.19	17.52
22	-5.33	4.46	6.95	0.82	-1.03	1.32	-1.29	0.26	183.23
23	35.86	7.18	36.57	-4.30	71.28	71.41	9.78	70.74	18.90
24	13.45	8.42	15.87	-14.75	22.48	26.89	-0.58	26.88	9.37
25	-3.06	21.93	22.15	-2.57	43.09	43.16	43.03	3.41	143.62
26	1.07	-4.00	4.14	-8.00	13.86	16.00	-15.45	4.14	4.14
27	-13.86	12.82	18.88	32.00	-44.00	54.41	-53.37	10.57	33.70
28	4.48	22.52	22.97	0.75	12.76	12.78	12.66	1.76	300.22
29	1.65	-0.30	1.68	0.21	0.30	0.36	0.15	0.33	8.50
30	-35.07	87.08	93.88	175.35	-1169.14	1182.22	-1150.01	274.09	32.15