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
$x = 7e^{t/7}$,
$y = 7e^{t/7}(0.1e^{2t/7} - 1)$,
$t_1 = 3$.

Вариант 2
$x = \cos(5t)(11 + 10\cos(5t))$,
$y = \sin(5t)(11 + 10\cos(5t))$,
$t_1 = \pi/30$.

Вариант 3
$x = \cos(3t)(8 + 7\cos(3t))$,
$y = \sin(3t)(8 + 7\cos(3t))$,
$t_1 = 7\pi/18$.

Вариант 4
$x = \cos(5t)(6 + 5\cos(5t))$,
$y = \sin(5t)(6 + 5\cos(5t))$,
$t_1 = 7\pi/15$.

Вариант 5
$x = 1500/(t + 9)$,
$y = (t - 11000)/(t + 9)^2$,
$t_1 = 7$.

Вариант 6
$x = 7\cos(2t)(1 + \cos(2t))$,
$y = 7\sin(2t)(1 + \cos(2t))$,
$t_1 = \pi/12$.

Вариант 7
$x = 13e^{t/13}$,
$y = 13e^{t/13}(0.1e^{2t/13} - 1)$,
$t_1 = 8$.

Вариант 8
$x = 4\sin(6t)$,
$y = \frac{4}{1+\sin^2(6t)}$,
$t_1 = 5\pi/36$.

Вариант 9
$x = 10t^2/(1 + t^2)$,
$y = 10t^3/(1 + t^2)$,
$t_1 = 2$.

Вариант 10
$x = 9(3t - \sin(3t))$,
$y = 9(1 - \cos(3t))$,
$t_1 = 11\pi/18$.

Вариант 11
$x = \frac{1}{5}(10/(e^{2t} + 1) + 1)$,
$y = e^{2t}$,
$t_1 = 0.1$.

Вариант 12
$x = 3\cos(24t)$,
$y = 5\sin^2(12t)$,
$t_1 = \pi/9$.

Вариант 13
$x = \frac{1}{2}(40/(t^2 + 1) + 1)$,
$y = t^2$,
$t_1 = 1.5$.

Вариант 14
$x = \frac{1}{10}(100/(t^2 + 1) + 1)$,
$y = t^2$,
$t_1 = 1.1$.

Вариант 15
$x = 11\cos(10t)$,
$y = 5\sin^2(5t)$,
$t_1 = 5\pi/33$.

Вариант 16
$x = 10t^3$,
$y = 11\sqrt{1 - t^6}$,
$t_1 = 0.86$.

Вариант 17
$x = 7\sin(5t)$,
$y = -0.7(9 + \cos^2(5t))\sin(5t)$,
$t_1 = 2\pi/15$.

Вариант 18
$x = 12\cos(10t)(1 + \cos(10t))$,
$y = 12\sin(10t)(1 + \cos(10t))$,
$t_1 = 13\pi/60$.

Вариант 19
$x = 10\sin(4t)$,
$y = 11 + 5\cos(8t)$,
$t_1 = \pi/12$.

Вариант 20
$x = 5\sin(4t)$,
$y = -0.5(9 + \cos^2(4t))\sin(4t)$,
$t_1 = 7\pi/12$.

Вариант 21
$x = 4\cos(10t)(1 + \cos(10t))$,
$y = 4\sin(10t)(1 + \cos(10t))$,
$t_1 = 13\pi/60$.

Вариант 22
$x = t$,
$y = 18(e^{t/36} + e^{-t/36})$,
$t_1 = 6$.

Вариант 23
$x = 4\sin(5t)$,
$y = 7\cos(5t) + 5$,
$t_1 = 2\pi/15$.

Вариант 24
$x = 5\cos^3(5t)$,
$y = 5\sin^3(5t)$,
$t_1 = \pi/6$.

Вариант 25
$x = 14e^{t/14}$,
$y = 14e^{t/14}(0.1e^{t/7} - 1)$,
$t_1 = 5$.

Вариант 26
$x = 6\sin(6t)$,
$y = \frac{6}{1+\sin^2(6t)}$,
$t_1 = 5\pi/36$.

Вариант 27
$x = 11t^2/(1 + t^2)$,
$y = 11t^3/(1 + t^2)$,
$t_1 = 5$.

Вариант 28
$x = 3\sin(5t)$,
$y = \frac{3}{1+\sin^2(5t)}$,
$t_1 = 2\pi/15$.

Вариант 29
$x = 3\sin(2t)$,
$y = 4 + 3\cos(4t)$,
$t_1 = \pi/3$.

Вариант 30
$x = 11t^4$,
$y = 12\sqrt{1 - t^8}$,
$t_1 = 0.81$.

Ответы

	v_x	v_y	v	W_x	W_y	W	W_τ	W_n	R
	sm/s			sm/s^2					sm
1	1.54	−0.45	1.60	0.22	0.25	0.33	0.14	0.30	8.60
2	−70.80	72.63	101.43	−488.16	−570.51	750.85	−67.78	747.79	13.76
3	−6.19	−10.28	12.00	−0.65	−73.12	73.12	62.99	37.14	3.88
4	−47.63	2.50	47.70	50.00	−346.41	350.00	−68.09	343.31	6.63
5	−5.86	5.37	7.95	0.73	−1.01	1.25	−1.22	0.25	255.14
6	−19.12	19.12	27.05	−52.25	−62.50	81.46	−7.25	81.14	9.02
7	1.85	0.05	1.85	0.14	0.30	0.33	0.15	0.29	11.72
8	−20.78	13.30	24.68	−72.00	18.43	74.32	70.58	23.29	26.15
9	1.60	11.20	11.31	−1.76	−0.32	1.79	−0.57	1.70	75.42
10	3.62	−13.50	13.98	−40.50	70.15	81.00	−78.24	20.96	9.32
11	−0.99	2.44	2.64	0.20	4.89	4.89	4.45	2.02	3.44
12	−62.35	51.96	81.17	864.00	−720.00	1124.68	−1124.68	0.00	∞
13	−5.68	3.00	6.42	6.70	2.00	6.99	−4.99	4.90	8.43
14	−4.50	2.20	5.01	4.87	2.00	5.27	−3.50	3.94	6.38
15	109.88	−24.97	112.68	−52.34	11.90	53.67	−53.67	0.00	∞
16	22.19	−20.12	29.95	51.60	−164.65	172.55	148.82	87.32	10.27
17	−17.50	13.56	22.14	−151.55	140.19	206.45	205.67	17.97	27.28
18	−163.92	163.92	231.82	−2239.23	−2678.46	3491.18	−310.58	3477.33	15.45
19	20.00	−34.64	40.00	−138.56	160.00	211.66	−207.85	40.00	40.00
20	10.00	−7.75	12.65	−69.28	64.09	94.38	−94.02	8.21	19.49
21	−54.64	54.64	77.27	−746.41	−892.82	1163.73	−103.53	1159.11	5.15
22	1.00	0.17	1.01	0.00	0.03	0.03	0.00	0.03	37.01
23	−10.00	−30.31	31.92	−86.60	87.50	123.11	−55.96	109.66	9.29
24	−28.13	−16.24	32.48	81.19	234.37	248.04	−187.50	162.38	6.50
25	1.43	−0.55	1.53	0.10	0.09	0.13	0.06	0.12	20.13
26	−31.18	19.95	37.02	−108.00	27.65	111.48	105.87	34.93	39.22
27	0.16	11.39	11.39	−0.09	−0.14	0.17	−0.14	0.09	1431.56
28	−7.50	4.24	8.62	−64.95	45.48	79.29	78.93	7.61	9.75
29	−3.00	10.39	10.82	−10.39	24.00	26.15	25.94	3.33	35.15
30	23.38	−12.17	26.36	86.61	−118.80	147.02	131.66	65.42	10.62