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
$x = 39t/(1 + t^3)$,
$y = 39t^2/(1 + t^3)$,
$t_1 = 0.7$.

Вариант 2
$x = 3\cos(3t)(1 + \cos(3t))$,
$y = 3\sin(3t)(1 + \cos(3t))$,
$t_1 = \pi/9$.

Вариант 3
$x = 13e^{t/13}$,
$y = 13e^{t/13}(0.1e^{2t/13} - 1)$,
$t_1 = 2$.

Вариант 4
$x = 36t/(1 + t^3)$,
$y = 36t^2/(1 + t^3)$,
$t_1 = 0.3$.

Вариант 5
$x = 7t^2/(1 + t^2)$,
$y = 7t^3/(1 + t^2)$,
$t_1 = 7$.

Вариант 6
$x = 6t/(1 + t^3)$,
$y = 6t^2/(1 + t^3)$,
$t_1 = 0.5$.

Вариант 7
$x = \frac{8(t^2-1)}{1+t^2}$,
$y = \frac{8(t^2-1)t}{1+t^2}$,
$t_1 = 9$.

Вариант 8
$x = \frac{1}{5}\left(\frac{41}{\sin(2t)+2} + 1\right)$,
$y = 5\sin(2t)$,
$t_1 = \pi/6$.

Вариант 9
$x = \cos(3t)(5 + 4\cos(3t))$,
$y = \sin(3t)(5 + 4\cos(3t))$,
$t_1 = 13\pi/18$.

Вариант 10
$x = 10t^2/(1 + t^2)$,
$y = 10t^3/(1 + t^2)$,
$t_1 = 8$.

Вариант 11
$x = 8e^{-4t}$,
$y = 24\sqrt{1 - e^{-8t}}$,
$t_1 = 0.09$.

Вариант 12
$x = 9\cos(10t)$,
$y = 5\sin^2(5t)$,
$t_1 = 4\pi/27$.

Вариант 13
$x = 4\sin(6t)$,
$y = \frac{4}{1+\sin^2(6t)}$,
$t_1 = \pi/6$.

Вариант 14
$x = 9t^2/(1 + t^2)$,
$y = 9t^3/(1 + t^2)$,
$t_1 = 10$.

Вариант 15
$x = 6(2t - \sin(2t))$,
$y = 6(1 - \cos(2t))$,
$t_1 = \pi/6$.

Вариант 16
$x = 8t^2/(1 + t^2)$,
$y = 8t^3/(1 + t^2)$,
$t_1 = 7$.

Вариант 17
$x = 3 + 6\cos(t)$,
$y = 3\mathrm{tg}\ (t) + 6\sin t$,
$t_1 = 4\pi/15$.

Вариант 18
$x = \frac{1}{4}(16/(e^{4t} + 1) + 1)$,
$y = e^{4t}$,
$t_1 = 0.05$.

Вариант 19
$x = 8\cos^3(4t)$,
$y = 8\sin^3(4t)$,
$t_1 = \pi/6$.

Вариант 20
$x = \frac{1}{8}(2110/(t^5 + 1) + 1)$,
$y = t^5$,
$t_1 = 1.6$.

Вариант 21
$x = 3e^{-4t}$,
$y = 9\sqrt{1 - e^{-8t}}$,
$t_1 = 0.02$.

Вариант 22
$x = 4\sin(3t)$,
$y = 7\cos(3t) + 5$,
$t_1 = 11\pi/18$.

Вариант 23
$x = t$,
$y = 2(e^{t/4} + e^{-t/4})$,
$t_1 = 2$.

Вариант 24
$x = 11\cos(4t)(1 + \cos(4t))$,
$y = 11\sin(4t)(1 + \cos(4t))$,
$t_1 = 11\pi/24$.

Вариант 25
$x = 7\cos(6t)(1 + \cos(6t))$,
$y = 7\sin(6t)(1 + \cos(6t))$,
$t_1 = 5\pi/36$.

Вариант 26
$x = 12e^{t/12}$,
$y = 12e^{t/12}(0.1e^{t/6} - 1)$,
$t_1 = 2$.

Вариант 27
$x = \cos(2t)(5 + 4\cos(2t))$,
$y = \sin(2t)(5 + 4\cos(2t))$,
$t_1 = \pi/3$.

Вариант 28
$x = 4(2t - \sin(2t))$,
$y = 4(1 - \cos(2t))$,
$t_1 = 7\pi/12$.

Вариант 29
$x = 2(3t - \sin(3t))$,
$y = 2(1 - \cos(3t))$,
$t_1 = 7\pi/18$.

Вариант 30
$x = \frac{1}{5}(20/(e^{4t} + 1) + 1)$,
$y = e^{4t}$,
$t_1 = 0.04$.

Ответы

	v_x	v_y	v	W_x	W_y	W	W_τ	W_n	R
	sm/s			sm/s^2					sm
1	6.79	25.08	25.98	−78.43	−41.32	88.65	−60.38	64.91	10.40
2	−15.59	0.00	15.59	13.50	−70.15	71.44	−13.50	70.15	3.46
3	1.17	−0.69	1.36	0.09	0.02	0.09	0.07	0.06	29.15
4	32.29	20.20	38.09	−35.41	53.96	64.54	−1.40	64.52	22.48
5	0.04	7.13	7.13	−0.02	−0.04	0.04	−0.04	0.02	3151.07
6	3.56	4.44	5.69	−11.85	1.19	11.91	−6.48	10.00	3.24
7	0.04	8.19	8.19	−0.01	−0.04	0.04	−0.04	0.01	4849.97
8	−1.00	5.00	5.10	4.15	−17.32	17.81	−17.80	0.68	38.05
9	−17.89	18.99	26.09	−74.97	−84.85	113.23	−10.35	112.76	6.04
10	0.04	10.15	10.15	−0.01	−0.04	0.04	−0.04	0.01	7476.56
11	−22.33	65.23	68.94	89.30	−769.23	774.40	−756.70	164.62	28.87
12	89.85	−24.96	93.25	52.33	−14.54	54.31	54.31	0.00	109356020.31
13	−24.00	0.00	24.00	0.00	−288.00	288.00	0.00	288.00	2.00
14	0.02	9.09	9.09	−0.01	−0.02	0.02	−0.02	0.01	15908.94
15	6.00	10.39	12.00	20.78	12.00	24.00	20.78	12.00	12.00
16	0.04	8.15	8.15	−0.02	−0.04	0.05	−0.04	0.02	3601.23
17	−4.46	10.72	11.61	−4.01	10.42	11.17	11.17	0.30	451.68
18	−3.96	4.89	6.29	1.58	19.54	19.61	14.19	13.53	2.92
19	−20.78	−36.00	41.57	−240.00	−83.14	253.99	192.00	166.28	10.39
20	−65.51	32.77	73.25	210.02	81.92	225.43	−151.19	167.22	32.09
21	−11.08	79.78	80.55	44.31	−2477.44	2477.84	−2459.99	296.83	21.86
22	10.39	10.50	14.77	18.00	−54.56	57.45	−26.12	51.17	4.26
23	1.00	0.52	1.13	0.00	0.28	0.28	0.13	0.25	5.09
24	60.11	60.11	85.00	−328.42	392.84	512.04	45.55	510.01	14.17
25	15.37	−15.37	21.74	−33.76	310.48	312.31	−243.41	195.67	2.42
26	1.18	−0.69	1.37	0.10	0.03	0.10	0.07	0.07	26.20
27	−1.73	−9.00	9.17	26.00	10.39	28.00	−15.12	23.57	3.56
28	14.93	−4.00	15.45	−8.00	−13.86	16.00	−4.14	15.45	15.45
29	11.20	−3.00	11.59	−9.00	−15.59	18.00	−4.66	17.39	7.73
30	−3.97	4.69	6.15	1.27	18.78	18.82	13.51	13.10	2.89