

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).

Кирсанов М.Н. Решебник. Теоретическая механика с. 131.

<p>Вариант 1 $x = 10 \cos(20t),$ $y = 7 \sin^2(10t),$ $t_1 = 13\pi/60.$</p>	<p>Вариант 2 $x = 6e^{-5t},$ $y = 18\sqrt{1 - e^{-10t}},$ $t_1 = 0.03.$</p>
<p>Вариант 3 $x = 11t^3,$ $y = 12\sqrt{1 - t^6},$ $t_1 = 0.84.$</p>	<p>Вариант 4 $x = t,$ $y = 10(e^{t/20} + e^{-t/20}),$ $t_1 = 2.$</p>
<p>Вариант 5 $x = 9 \cos(20t),$ $y = 4 \sin^2(10t),$ $t_1 = 4\pi/27.$</p>	<p>Вариант 6 $x = 6 + 6 \cos(t),$ $y = 6t \operatorname{tg}(t) + 6 \sin t,$ $t_1 = \pi/15.$</p>
<p>Вариант 7 $x = 7(5t - \sin(5t)),$ $y = 7(1 - \cos(5t)),$ $t_1 = 13\pi/30.$</p>	<p>Вариант 8 $x = 11 \sin(4t),$ $y = 12 + 5 \cos(8t),$ $t_1 = \pi/6.$</p>
<p>Вариант 9 $x = 11 \sin(5t),$ $y = \frac{11}{1 + \sin^2(5t)},$ $t_1 = 2\pi/15.$</p>	<p>Вариант 10 $x = \frac{7(t^2 - 1)}{1 + t^2},$ $y = \frac{7(t^2 - 1)t}{1 + t^2},$ $t_1 = 9.$</p>
<p>Вариант 11 $x = 21t/(1 + t^3),$ $y = 21t^2/(1 + t^3),$ $t_1 = 0.3.$</p>	<p>Вариант 12 $x = 18t/(1 + t^3),$ $y = 18t^2/(1 + t^3),$ $t_1 = 0.8.$</p>
<p>Вариант 13 $x = \frac{1}{9}(230/(t^2 + 1) + 1),$ $y = t^2,$ $t_1 = 1.6.$</p>	<p>Вариант 14 $x = 3 \sin(9t),$ $y = \frac{3}{1 + \sin^2(9t)},$ $t_1 = 4\pi/15.$</p>
<p>Вариант 15 $x = \cos(2t)(11 + 10 \cos(2t)),$ $y = \sin(2t)(11 + 10 \cos(2t)),$ $t_1 = \pi/6.$</p>	<p>Вариант 16 $x = 4 \cos^3(5t),$ $y = 4 \sin^3(5t),$ $t_1 = \pi/30.$</p>
<p>Вариант 17 $x = 7t^2/(1 + t^2),$ $y = 7t^3/(1 + t^2),$ $t_1 = 7.$</p>	<p>Вариант 18 $x = \frac{11(t^2 - 1)}{1 + t^2},$ $y = \frac{11(t^2 - 1)t}{1 + t^2},$ $t_1 = 1.$</p>

<p>Вариант 19 $x = 7e^{2t} + 8,$ $y = e^{4t}/4,$ $t_1 = 0.5.$</p>	<p>Вариант 20 $x = 30/(t + 4),$ $y = (40 - 140t)/(t + 4)^3,$ $t_1 = 0.3.$</p>
<p>Вариант 21 $x = 6 \sin(3t),$ $y = 11 \cos(3t) + 7,$ $t_1 = \pi/18.$</p>	<p>Вариант 22 $x = 9e^{2t} + 10,$ $y = e^{4t}/3,$ $t_1 = 0.6.$</p>
<p>Вариант 23 $x = 2 \sin(5t),$ $y = 3 \cos(5t) + 3,$ $t_1 = 2\pi/15.$</p>	<p>Вариант 24 $x = 7(2t - \sin(2t)),$ $y = 7(1 - \cos(2t)),$ $t_1 = \pi/6.$</p>
<p>Вариант 25 $x = t,$ $y = 18(e^{t/36} + e^{-t/36}),$ $t_1 = 5.$</p>	<p>Вариант 26 $x = 5 \sin(2t),$ $y = 6 + 3 \cos(4t),$ $t_1 = 7\pi/6.$</p>
<p>Вариант 27 $x = 12t/(1 + t^3),$ $y = 12t^2/(1 + t^3),$ $t_1 = 0.1.$</p>	<p>Вариант 28 $x = 11 \cos^3(4t),$ $y = 11 \sin^3(4t),$ $t_1 = \pi/24.$</p>
<p>Вариант 29 $x = 21t/(1 + t^3),$ $y = 21t^2/(1 + t^3),$ $t_1 = 0.8.$</p>	<p>Вариант 30 $x = \frac{1}{9} \left(\frac{20}{\sin(3t)+2} + 1 \right),$ $y = 9 \sin(3t),$ $t_1 = 11\pi/18.$</p>

Ответы

	v_x	v_y	v	W_x	W_y	W	W_τ	W_n	R
	sm/s			sm/s ²					sm
1	-173.21	60.62	183.51	-2000.00	700.00	2118.96	2118.96	0.00	8475219.56
2	-25.82	130.96	133.49	129.11	-3181.31	3183.93	-3146.20	488.72	36.46
3	23.28	-18.69	29.86	55.44	-147.42	157.50	135.52	80.25	11.11
4	1.00	0.10	1.01	0.00	0.05	0.05	0.01	0.05	20.20
5	-20.90	4.64	21.41	3575.66	-794.59	3662.88	-3662.88	0.01	87717.01
6	-1.25	12.14	12.20	-5.87	1.42	6.04	2.01	5.69	26.16
7	4.69	17.50	18.12	87.50	151.55	175.00	169.04	45.29	7.25
8	-22.00	34.64	41.04	-152.42	160.00	220.98	216.78	42.89	39.26
9	-27.50	15.55	31.59	-238.16	166.76	290.74	289.40	27.91	35.76
10	0.04	7.17	7.17	-0.01	-0.04	0.04	-0.04	0.01	4243.72
11	18.84	11.78	22.22	-20.66	31.47	37.65	-0.82	37.64	13.12
12	-0.19	9.37	9.37	-29.75	-24.18	38.34	-23.58	30.24	2.91
13	-6.45	3.20	7.20	7.57	2.00	7.83	-5.89	5.15	10.07
14	8.34	-4.38	9.42	-231.11	132.71	266.50	-266.30	10.19	8.71
15	-36.37	1.00	36.39	18.00	-107.39	108.89	-20.94	106.85	12.39
16	-22.50	12.99	25.98	-64.95	187.50	198.43	150.00	129.90	5.20
17	0.04	7.13	7.13	-0.02	-0.04	0.04	-0.04	0.02	3151.07
18	11.00	11.00	15.56	-11.00	11.00	15.56	0.00	15.56	15.56
19	38.06	7.39	38.77	76.11	29.56	81.65	80.35	14.51	103.59
20	-1.62	-1.74	2.38	0.75	2.44	2.55	-2.30	1.11	5.11
21	15.59	-16.50	22.70	-27.00	-85.74	89.89	43.78	78.51	6.56
22	59.76	14.70	61.54	119.52	58.79	133.20	130.11	28.54	132.69
23	-5.00	-12.99	13.92	-43.30	37.50	57.28	-19.44	53.88	3.60
24	7.00	12.12	14.00	24.25	14.00	28.00	24.25	14.00	14.00
25	1.00	0.14	1.01	0.00	0.03	0.03	0.00	0.03	36.70
26	5.00	-10.39	11.53	-17.32	24.00	29.60	-29.14	5.20	25.56
27	11.95	2.39	12.19	-1.43	23.76	23.80	3.26	23.58	6.30
28	-49.50	28.58	57.16	-114.32	330.00	349.24	264.00	228.63	14.29
29	-0.22	10.93	10.94	-34.71	-28.21	44.73	-27.51	35.28	3.39
30	-2.57	23.38	23.52	4.44	40.50	40.74	39.77	8.84	62.62