Декартовы координаты. Пространственая траектория

Точка движется по закону $x = x(t), y = y(t),\ z = z(t)$. Определить скорость, ускорение точки и радиус кривизны траектории при $t = t_1$ (x, y и z даны в см, t и t_1 — в с).

Кирсанов М.Н. **Решебник. Теоретическая механика**/Под ред. А. И. Кириллова.– М.:ФИЗМАТЛИТ, 2002.– 384 с. (с.137.)

Задача 2.1.

$x = 6\ln(3t+2),$
$y = 7\sqrt{3t+7},$
$z = \frac{1}{2}\sin 6t + 7t,\ t_1 = 0.6.$

Задача 2.2.

$x = \dfrac{14}{t+2},$
$y = 11e^{(t^2)},$
$z = 2\arcsin(t/11),\ t_1 = 1.$

Задача 2.3.

$x = 7\sqrt{3t+7},$
$y = 17e^{t/3},$
$z = 3\arcsin(t/7),\ t_1 = 0.6.$

Задача 2.4.

$x = \frac{1}{2}\sin^2 4t - 2t,$
$y = \ln(4t+2),$
$z = 12e^{t/2},\ t_1 = 0.1.$

Задача 2.5.

$x = 2e^{(t^2)},$
$y = 2\sqrt{4t+2},$
$z = t^2 + 2t + 4,\ t_1 = 0.1.$

Задача 2.6.

$x = 16e^{t/3},$
$y = \frac{1}{2}\sin^2 6t - 6t,$
$z = 2t^2 + 6t + 3,\ t_1 = 0.5.$

Задача 2.7.

$x = \frac{1}{2}\sin 4t + 2t,$
$y = 3t + \frac{1}{4}\cos^2 8t,$
$z = 2\arcsin(t/2),\ t_1 = 0.1.$

Задача 2.8.

$x = 6\sqrt{4t+6},$
$y = 7(t+1)^{1/10},$
$z = 7t + \frac{1}{4}\cos^2 8t,\ t_1 = 0.5.$

Задача 2.9.

$x = \frac{1}{2}\sin 8t + 2t,$
$y = 3(t+1)^{3/10},$
$z = 3t + \cos^2 4t,\ t_1 = 0.1.$

Задача 2.10.

$x = 4\mathrm{tg}(t/3),$
$y = 19e^{t/3},$
$z = 2t^2 + 9t + 3,\ t_1 = 0.8.$

Задача 2.11.

$x = 18e^{t/4},$
$y = 3t^2 + 8t + 2,$
$z = 4\arcsin(t/8),\ t_1 = 0.7.$

Задача 2.12.

$x = 2t^2 + 6t + 3,$
$y = \frac{1}{2}\sin^2 6t - 6t,$
$z = 2t^2 + 6t + 3,\ t_1 = 0.5.$

Задача 2.13.

$x = 2\arcsin(t/7),$
$y = 7\sqrt{4t+7},$
$z = 7e^{(t^2)},\ t_1 = 0.6.$

Задача 2.14.

$x = 3\mathrm{tg}(t/2),$
$y = \dfrac{14}{t+2},$
$z = 11e^{(t^2)},\ t_1 = 1.$

Задача 2.15.

$x = 7t + \frac{1}{4}\cos^2 8t,$
$y = 6\sqrt{4t+6},$
$z = 16e^{t/2},\ t_1 = 0.5.$

Задача 2.16. 8

$x = 2\arcsin(t/7),$
$y = 17e^{t/2},$
$z = 7e^{(t^2)},\ t_1 = 0.6.$

Задача 2.17. 8

$x = 5\mathrm{tg}(t/4),$
$y = 8(t+1)^{3/10},$
$z = 3t^2 + 7t + 2,\ t_1 = 0.6.$

Задача 2.18. 8

$x = 7(t+1)^{3/10},$
$y = \frac{1}{2}\sin^2 8t - 6t,$
$z = \frac{1}{2}\sin 8t + 6t,\ t_1 = 0.5.$

Задача 2.19. 8

$x = 2\arcsin(t/9),$
$y = 9\sqrt{4t+9},$
$z = 3\mathrm{tg}(t/2),\ t_1 = 0.8.$

Задача 2.20. 8

$x = \dfrac{11}{2t+3},$
$y = 9t + \frac{1}{2}\cos^2 6t,$
$z = \frac{1}{2}\sin^2 6t - 8t,\ t_1 = 0.7.$

Задача 2.21. 8

$x = \dfrac{14}{2t+3},$
$y = 21e^{t/3},$
$z = 4\mathrm{tg}(t/3),\ t_1 = 1.$

Задача 2.22. 8

$x = 3(t+1)^{1/5},$
$y = 2t^2 + 2t + 3,$
$z = 4\mathrm{tg}(t/3),\ t_1 = 0.1.$

Задача 2.23. 8

$x = \dfrac{5}{t+2},$
$y = \ln(4t+2),$
$z = 2e^{(t^2)},\ t_1 = 0.1.$

Задача 2.24. 8

$x = \dfrac{12}{t+2},$
$y = 3\mathrm{tg}(t/2),$
$z = 10(t+1)^{1/10},\ t_1 = 0.8.$

Задача 2.25. 8

$x = 4\arcsin(t/7),$
$y = 7\sqrt{2t+7},$
$z = 5\mathrm{tg}(t/4),\ t_1 = 0.6.$

Задача 2.26. 8

$x = 8t + \frac{1}{2}\cos^2 6t,$
$y = 7e^{(t^2)},$
$z = \frac{1}{2}\sin 6t + 7t,\ t_1 = 0.6.$

Задача 2.27. 8

$x = t^2 + 11t + 4,$
$y = 11e^{(t^2)},$
$z = \frac{1}{2}\sin^2 4t - 11t,\ t_1 = 1.$

Задача 2.28. 8

$x = 9\sqrt{4t+9},$
$y = 10(t+1)^{1/10},$
$z = 3\mathrm{tg}(t/2),\ t_1 = 0.8.$

Задача 2.29. 8

$x = 4\arcsin(t/6),$
$y = 5\mathrm{tg}(t/4),$
$z = 7t + \cos^2 4t,\ t_1 = 0.5.$

Задача 2.30. 8

$x = 17e^{t/2},$
$y = 7e^{(t^2)},$
$z = 6\ln(4t+2),\ t_1 = 0.6.$

Задача 2.31. 8

$x = 7\sqrt{4t+7},$
$y = 3\mathrm{tg}(t/2),$
$z = \frac{1}{2}\sin^2 4t - 7t,\ t_1 = 0.6.$

Задача 2.32. 8

$x = \frac{1}{2}\sin 4t + 10t,$
$y = \dfrac{13}{t+2},$
$z = 20e^{t/2},\ t_1 = 0.9.$

Задача 2.33. 8

$x = 3\mathrm{tg}(t/2),$
$y = 6e^{(t^2)},$
$z = 2\arcsin(t/6),\ t_1 = 0.5.$

Декартовы координаты. Пространственая траектория

№	v_x	v_y	v_z	v	a_x	a_y	a_z	a	a_τ	a_n	R
1	4.74	3.54	4.31	7.32	−3.74	−0.60	7.97	8.82	1.98	8.60	6.229
2	−1.56	59.80	0.18	59.82	1.04	179.41	0.00	179.41	179.32	5.73	624.801
3	3.54	6.92	0.43	7.79	−0.60	2.31	0.01	2.38	1.78	1.59	38.116
4	−0.57	1.67	6.31	6.55	11.15	−2.78	3.15	11.91	1.37	11.83	3.624
5	0.40	2.58	2.20	3.42	4.12	−2.15	2.00	5.06	0.15	5.06	2.307
6	6.30	−6.84	8.00	12.27	2.10	34.57	4.00	34.86	−15.58	31.18	4.825
7	3.84	1.00	1.00	4.09	−3.12	0.93	0.03	3.25	−2.69	1.83	9.160
8	4.24	0.49	5.02	6.59	−1.06	−0.29	4.66	4.78	2.84	3.85	11.291
9	4.79	0.84	0.13	4.86	−22.96	−0.54	−22.29	32.00	−23.29	21.95	1.077
10	1.43	8.27	12.20	14.81	0.26	2.76	4.00	4.86	4.86	0.21	1026.464
11	5.36	12.20	0.50	13.34	1.34	6.00	0.01	6.15	6.03	1.21	147.305
12	8.00	−6.84	8.00	13.22	4.00	34.57	4.00	35.03	−13.04	32.51	5.376
13	0.29	4.57	12.04	12.88	0.00	−0.97	34.51	34.53	31.92	13.17	12.599
14	1.95	−1.56	59.80	59.85	1.06	1.04	179.41	179.41	179.26	7.43	481.847
15	5.02	4.24	10.27	12.20	4.66	−1.06	5.14	7.01	5.87	3.83	38.822
16	0.29	11.47	12.04	16.63	0.00	5.74	34.51	34.99	28.94	19.66	14.071
17	1.28	1.73	10.60	10.82	0.10	−0.76	6.00	6.05	5.77	1.81	64.647
18	1.58	−2.04	3.39	4.26	−0.74	−9.31	24.22	25.96	23.45	11.14	1.628
19	0.22	5.15	1.77	5.45	0.00	−0.84	0.75	1.13	−0.56	0.98	30.291
20	−1.14	6.44	−5.44	8.50	1.03	18.69	−18.69	26.46	25.97	5.06	14.288
21	−1.12	9.77	1.49	9.95	0.90	3.26	0.34	3.39	3.15	1.27	78.032
22	0.56	2.40	1.33	2.80	−0.40	4.00	0.03	4.02	3.36	2.21	3.556
23	−1.13	1.67	0.40	2.06	1.08	−2.78	4.12	5.09	−2.04	4.66	0.907
24	−1.53	1.77	0.59	2.41	1.09	0.75	−0.29	1.36	−0.22	1.34	4.343
25	0.57	2.44	1.28	2.82	0.01	−0.30	0.10	0.31	−0.21	0.23	34.572
26	5.62	12.04	4.31	13.97	−21.90	34.51	7.97	41.65	23.40	34.45	5.663
27	13.00	59.80	−9.02	61.86	2.00	179.41	−2.33	179.43	174.20	43.03	88.938
28	5.15	0.59	1.77	5.48	−0.84	−0.29	0.75	1.17	−0.58	1.01	29.776
29	0.67	1.27	10.03	10.13	0.01	0.08	20.92	20.92	20.72	2.89	35.509
30	11.47	12.04	5.45	17.50	5.74	34.51	−4.96	35.34	25.96	23.98	12.776
31	4.57	1.64	−8.99	10.22	−0.97	0.51	1.40	1.78	−1.58	0.81	129.309
32	8.21	−1.55	15.68	17.77	3.54	1.07	7.84	8.67	8.46	1.88	168.211
33	1.60	7.70	0.33	7.88	0.41	23.11	0.00	23.12	22.69	4.40	14.095