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. 6

$x = 7\sqrt{2t+7},$
$y = \frac{1}{2}\sin^2 8t - 7t,$
$z = 3t^2 + 7t + 2,\ t_1 = 0.6.$

Задача 2.2. 6

$x = 10(t+1)^{1/10},$
$y = 10t + \frac{1}{4}\cos^2 8t,$
$z = \dfrac{12}{t+2},\ t_1 = 0.8.$

Задача 2.3. 6

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

Задача 2.4. 6

$x = 11\sqrt{4t+11},$
$y = 12t + \frac{1}{4}\cos^2 8t,$
$z = 3\mathrm{tg}(t/2),\ t_1 = 1.$

Задача 2.5. 6

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

Задача 2.6. 6

$x = 6(t+1)^{1/5},$
$y = 4\ln(3t+2),$
$z = 2t^2 + 5t + 3,\ t_1 = 0.4.$

Задача 2.7. 6

$x = 4t + \cos^2 4t,$
$y = 3\sqrt{2t+3},$
$z = 13e^{t/4},\ t_1 = 0.2.$

Задача 2.8. 6

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

Задача 2.9. 6

$x = 5\ln(2t+2),$
$y = 6e^{(t^2)},$
$z = 3t^2 + 6t + 2,\ t_1 = 0.5.$

Задача 2.10. 6

$x = 3e^{(t^2)},$
$y = \frac{1}{2}\sin 6t + 3t,$
$z = 3\arcsin(t/3),\ t_1 = 0.2.$

Задача 2.11. 6

$x = 7\sqrt{2t+7},$
$y = \frac{1}{2}\sin^2 8t - 7t,$
$z = 8(t+1)^{3/10},\ t_1 = 0.6.$

Задача 2.12. 6

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

Задача 2.13. 6

$x = 13e^{t/3},$
$y = \frac{1}{2}\sin^2 6t - 3t,$
$z = \frac{1}{2}\sin 6t + 3t,\ t_1 = 0.2.$

Задача 2.14. 6

$x = 2\arcsin(t/6),$
$y = \frac{1}{2}\sin 4t + 6t,$
$z = 3\mathrm{tg}(t/2),\ t_1 = 0.5.$

Задача 2.15. 6

$x = 3t^2 + 3t + 2,$
$y = 4(t+1)^{3/10},$
$z = \frac{1}{2}\sin 8t + 3t,\ t_1 = 0.2.$

Задача 2.16. 6

$x = 13e^{t/2},$
$y = 2\ln(4t+2),$
$z = t^2 + 3t + 4,\ t_1 = 0.2.$

Задача 2.17. 6

$x = 2\sqrt{3t+2},$
$y = 3t + \frac{1}{2}\cos^2 6t,$
$z = \frac{1}{2}\sin^2 6t - 2t,\ t_1 = 0.1.$

Задача 2.18. 6

$x = 8e^{(t^2)},$
$y = \dfrac{11}{3t+4},$
$z = \frac{1}{2}\sin 8t + 8t,\ t_1 = 0.7.$

Задача 2.19. 6

$x = \dfrac{11}{2t+3},$
$y = 7\ln(3t+2),$
$z = 18e^{t/3},\ t_1 = 0.7.$

Задача 2.20. 6

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

Задача 2.21. 6

$x = 3t + \cos^2 4t,$
$y = \frac{1}{2}\sin 8t + 2t,$
$z = 5\mathrm{tg}(t/4),\ t_1 = 0.1.$

Задача 2.22. 6

$x = 6(t+1)^{1/10},$
$y = \dfrac{8}{t+2},$
$z = 6t + \frac{1}{4}\cos^2 8t,\ t_1 = 0.4.$

Задача 2.23. 6

$x = 5\sqrt{3t+5},$
$y = \frac{1}{2}\sin 6t + 5t,$
$z = 6(t+1)^{1/5},\ t_1 = 0.4.$

Задача 2.24. 6

$x = t^2 + 2t + 4,$
$y = \dfrac{5}{t+2},$
$z = 2\sqrt{4t+2},\ t_1 = 0.1.$

Задача 2.25. 6

$x = \frac{1}{2}\sin^2 6t - 7t,$
$y = 2t^2 + 7t + 3,$
$z = 8(t+1)^{1/5},\ t_1 = 0.6.$

Задача 2.26. 6

$x = \frac{1}{2}\sin 6t + 4t,$
$y = \dfrac{7}{2t+3},$
$z = 3\arcsin(t/4),\ t_1 = 0.3.$

Задача 2.27. 6

$x = 3(t+1)^{1/10},$
$y = \ln(4t+2),$
$z = 12e^{t/2},\ t_1 = 0.1.$

Задача 2.28. 6

$x = t^2 + 9t + 4,$
$y = 19e^{t/2},$
$z = 10(t+1)^{1/10},\ t_1 = 0.8.$

Задача 2.29. 6

$x = 4\sqrt{2t+4},$
$y = 14e^{t/4},$
$z = 5(t+1)^{3/10},\ t_1 = 0.3.$

Задача 2.30. 6

$x = 8t + \frac{1}{2}\cos^2 6t,$
$y = 17e^{t/3},$
$z = \frac{1}{2}\sin^2 6t - 7t,\ t_1 = 0.6.$

Задача 2.31. 6

$x = \frac{1}{2}\sin^2 6t - 2t,$
$y = 2\sqrt{3t+2},$
$z = 3t + \frac{1}{2}\cos^2 6t,\ t_1 = 0.1.$

Задача 2.32. 6

$x = 5(t+1)^{1/5},$
$y = \frac{1}{2}\sin 6t + 4t,$
$z = \frac{1}{2}\sin^2 6t - 4t,\ t_1 = 0.3.$

Задача 2.33. 6

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

2.6

Декартовы координаты. Пространственая траектория

№	v_x	v_y	v_z	v	a_x	a_y	a_z	a	a_τ	a_n	R
1	2.44	−7.70	10.60	13.33	−0.30	−63.02	6.00	63.31	41.12	48.13	3.689
2	0.59	9.54	−1.53	9.68	−0.29	−31.13	1.09	31.15	−30.87	4.17	22.467
3	0.40	2.20	1.67	2.79	4.12	2.00	−2.78	5.36	0.51	5.33	1.459
4	5.68	12.58	1.95	13.94	−0.76	30.65	1.06	30.67	27.49	13.60	14.282
5	15.00	0.27	59.80	61.66	4.00	0.00	179.41	179.45	174.99	39.78	95.570
6	0.92	3.75	6.60	7.65	−0.52	−3.52	4.00	5.35	1.67	5.09	11.497
7	0.00	1.63	3.42	3.78	0.93	−0.48	0.85	1.35	0.57	1.23	11.648
8	3.54	12.04	1.39	12.63	−0.60	34.51	0.19	34.52	32.76	10.87	14.665
9	3.33	7.70	9.00	12.31	−2.22	23.11	6.00	23.98	18.25	15.55	9.738
10	1.25	4.09	1.00	4.39	6.74	−16.78	0.02	18.08	−13.70	11.80	1.632
11	2.44	−7.70	1.73	8.26	−0.30	−63.02	−0.76	63.03	58.49	23.48	2.905
12	1.73	−0.89	7.35	7.60	−0.76	0.92	31.88	31.90	30.54	9.22	6.269
13	4.63	−0.97	4.09	6.25	1.54	−26.55	−16.78	31.44	−5.69	30.92	1.265
14	0.33	5.17	1.60	5.42	0.00	−7.27	0.41	7.29	−6.82	2.57	11.410
15	4.20	1.06	2.88	5.20	6.00	−0.62	−31.99	32.55	−13.01	29.84	0.907
16	7.18	2.86	3.40	8.45	3.59	−4.08	2.00	5.79	2.48	5.24	13.623
17	1.98	0.20	0.80	2.14	−1.29	−13.04	13.04	18.49	2.42	18.33	0.250
18	18.28	−0.89	11.10	21.41	51.71	0.87	20.20	55.52	54.60	10.08	45.480
19	−1.14	5.12	7.58	9.22	1.03	−3.75	2.53	4.64	−0.13	4.63	18.328
20	0.29	8.20	12.04	14.57	0.00	2.00	34.51	34.57	29.65	17.79	11.936
21	0.13	4.79	1.25	4.95	−22.29	−22.96	0.02	32.00	−22.79	22.47	1.090
22	0.44	−1.39	5.77	5.95	−0.28	1.16	−31.78	31.80	−31.10	6.64	5.331
23	3.01	2.79	0.92	4.21	−0.73	−12.16	−0.52	12.19	−8.70	8.54	2.070
24	2.20	−1.13	2.58	3.58	2.00	1.08	−2.15	3.13	−0.67	3.06	4.183
25	−4.62	9.40	1.10	10.53	21.90	4.00	−0.55	22.27	−6.09	21.42	5.177
26	3.32	−1.08	0.75	3.57	−17.53	1.20	0.01	17.57	−16.65	5.60	2.276
27	0.28	1.67	6.31	6.53	−0.23	−2.78	3.15	4.21	2.33	3.51	12.161
28	10.60	14.17	0.59	17.71	2.00	7.09	−0.29	7.37	6.86	2.69	116.398
29	1.87	3.77	1.25	4.39	−0.41	0.94	−0.67	1.23	0.45	1.14	16.863
30	5.62	6.92	−4.62	10.04	−21.90	2.31	21.90	31.06	−20.74	23.12	4.361
31	0.80	1.98	0.20	2.14	13.04	−1.29	−13.04	18.49	2.42	18.33	0.250
32	0.81	3.32	−5.33	6.33	−0.50	−17.53	−32.28	36.74	17.92	32.07	1.249
33	1.64	−1.48	8.35	8.64	0.51	1.14	31.51	31.53	30.36	8.52	8.754