

## Декартовы координаты. Пространственная 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).

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<p><b>Задача 2.1</b> <span style="float: right;">2</span></p> $x = 11t + \frac{1}{2} \cos^2 6t,$ $y = 10e^{(t^2)},$ $z = \frac{1}{2} \sin^2 6t - 10t, \quad t_1 = 0.9.$	<p><b>Задача 2.2</b> <span style="float: right;">2</span></p> $x = 2\arcsin(t/5),$ $y = \frac{8}{t+2},$ $z = 5e^{(t^2)}, \quad t_1 = 0.4.$	<p><b>Задача 2.3</b> <span style="float: right;">2</span></p> $x = 3t^2 + 2t + 2,$ $y = 3t + \cos^2 4t,$ $z = \ln(2t + 2), \quad t_1 = 0.1.$
<p><b>Задача 2.4</b> <span style="float: right;">2</span></p> $x = \frac{1}{2} \sin 4t + 7t,$ $y = 8(t+1)^{1/10},$ $z = 17e^{t/2}, \quad t_1 = 0.6.$	<p><b>Задача 2.5</b> <span style="float: right;">2</span></p> $x = 3t^2 + 4t + 2,$ $y = \frac{1}{2} \sin^2 8t - 4t,$ $z = 4e^{(t^2)}, \quad t_1 = 0.3.$	<p><b>Задача 2.6</b> <span style="float: right;">2</span></p> $x = 11e^{(t^2)},$ $y = 11\sqrt{2t+11},$ $z = 12(t+1)^{3/10}, \quad t_1 = 1.$
<p><b>Задача 2.7</b> <span style="float: right;">2</span></p> $x = 18e^{t/3},$ $y = 3\arcsin(t/8),$ $z = 9(t+1)^{1/5}, \quad t_1 = 0.7.$	<p><b>Задача 2.8</b> <span style="float: right;">2</span></p> $x = 11(t+1)^{3/10},$ $y = \frac{1}{2} \sin 8t + 10t,$ $z = 4\arcsin(t/10), \quad t_1 = 0.9.$	<p><b>Задача 2.9</b> <span style="float: right;">2</span></p> $x = 5\sqrt{3t+5},$ $y = 3\arcsin(t/5),$ $z = 2t^2 + 5t + 3, \quad t_1 = 0.4.$
<p><b>Задача 2.10</b> <span style="float: right;">2</span></p> $x = 2t^2 + 10t + 3,$ $y = 11(t+1)^{1/5},$ $z = \frac{1}{2} \sin^2 6t - 10t, \quad t_1 = 0.9.$	<p><b>Задача 2.11</b> <span style="float: right;">2</span></p> $x = 7e^{(t^2)},$ $y = 8(t+1)^{1/5},$ $z = 6 \ln(3t+2), \quad t_1 = 0.6.$	<p><b>Задача 2.12</b> <span style="float: right;">2</span></p> $x = 5\sqrt{3t+5},$ $y = 6t + \frac{1}{2} \cos^2 6t,$ $z = 4\operatorname{tg}(t/3), \quad t_1 = 0.4.$
<p><b>Задача 2.13</b> <span style="float: right;">2</span></p> $x = 7e^{(t^2)},$ $y = 3t^2 + 7t + 2,$ $z = 6 \ln(2t+2), \quad t_1 = 0.6.$	<p><b>Задача 2.14</b> <span style="float: right;">2</span></p> $x = 5e^{(t^2)},$ $y = 5\sqrt{4t+5},$ $z = t^2 + 5t + 4, \quad t_1 = 0.4.$	<p><b>Задача 2.15</b> <span style="float: right;">2</span></p> $x = \ln(2t+2),$ $y = 2\sqrt{2t+2},$ $z = \frac{5}{3t+4}, \quad t_1 = 0.1.$

<p><b>Задача 2.16</b> <span style="float: right;">2</span></p> $x = 6(t + 1)^{1/10},$ $y = 15e^{t/2},$ $z = 6t + \frac{1}{4} \cos^2 8t, \quad t_1 = 0.4.$	<p><b>Задача 2.17</b> <span style="float: right;">2</span></p> $x = 2t^2 + 7t + 3,$ $y = 6 \ln(3t + 2),$ $z = 8(t + 1)^{1/5}, \quad t_1 = 0.6.$	<p><b>Задача 2.18</b> <span style="float: right;">2</span></p> $x = 9t + \frac{1}{4} \cos^2 8t,$ $y = \frac{1}{2} \sin 4t + 8t,$ $z = 8\sqrt{4t + 8}, \quad t_1 = 0.7.$
<p><b>Задача 2.19</b> <span style="float: right;">2</span></p> $x = \frac{1}{2} \sin^2 8t - 6t,$ $y = 7t + \cos^2 4t,$ $z = \frac{1}{2} \sin^2 8t - 6t, \quad t_1 = 0.5.$	<p><b>Задача 2.20</b> <span style="float: right;">2</span></p> $x = 10\sqrt{3t + 10},$ $y = 4\operatorname{tg}(t/3),$ $z = 3\arcsin(t/10), \quad t_1 = 0.9.$	<p><b>Задача 2.21</b> <span style="float: right;">2</span></p> $x = 7t + \frac{1}{4} \cos^2 8t,$ $y = 5 \ln(4t + 2),$ $z = \frac{1}{2} \sin^2 4t - 6t, \quad t_1 = 0.5.$
<p><b>Задача 2.22</b> <span style="float: right;">2</span></p> $x = 8e^{(t^2)},$ $y = 4\arcsin(t/8),$ $z = \frac{11}{3t + 4}, \quad t_1 = 0.7.$	<p><b>Задача 2.23</b> <span style="float: right;">2</span></p> $x = 2t^2 + 4t + 3,$ $y = \frac{1}{2} \sin^2 6t - 4t,$ $z = 4\operatorname{tg}(t/3), \quad t_1 = 0.3.$	<p><b>Задача 2.24</b> <span style="float: right;">2</span></p> $x = 7(t + 1)^{1/10},$ $y = 5 \ln(4t + 2),$ $z = 16e^{t/2}, \quad t_1 = 0.5.$
<p><b>Задача 2.25</b> <span style="float: right;">2</span></p> $x = 3\arcsin(t/10),$ $y = 11t + \frac{1}{2} \cos^2 6t,$ $z = \frac{1}{2} \sin 6t + 10t, \quad t_1 = 0.9.$	<p><b>Задача 2.26</b> <span style="float: right;">2</span></p> $x = 12(t + 1)^{1/5},$ $y = \frac{1}{2} \sin 6t + 11t,$ $z = 3\arcsin(t/11), \quad t_1 = 1.$	<p><b>Задача 2.27</b> <span style="float: right;">2</span></p> $x = 19e^{t/4},$ $y = 4\arcsin(t/9),$ $z = 8 \ln(2t + 2), \quad t_1 = 0.8.$
<p><b>Задача 2.28</b> <span style="float: right;">2</span></p> $x = 2t^2 + 11t + 3,$ $y = 21e^{t/3},$ $z = \frac{1}{2} \sin^2 6t - 11t, \quad t_1 = 1.$	<p><b>Задача 2.29</b> <span style="float: right;">2</span></p> $x = 6 \ln(3t + 2),$ $y = \frac{10}{2t + 3},$ $z = \frac{1}{2} \sin^2 6t - 7t, \quad t_1 = 0.6.$	<p><b>Задача 2.30</b> <span style="float: right;">2</span></p> $x = 9 \ln(2t + 2),$ $y = 4\arcsin(t/10),$ $z = \frac{1}{2} \sin^2 8t - 10t, \quad t_1 = 0.9.$

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№	$v_x$	$v_y$	$v_z$	$v$	$a_x$	$a_y$	$a_z$	$a$	$a_\tau$	$a_n$	$R$
1	13.94	40.46	-12.94	44.71	7.00	117.79	-7.00	118.21	110.80	41.17	48.555
2	0.40	-1.39	4.69	4.91	0.01	1.16	15.49	15.53	14.48	5.63	4.285
3	2.60	0.13	0.91	2.76	6.00	-22.29	-0.83	23.10	4.33	22.69	0.335
4	5.53	0.52	11.47	12.75	-5.40	-0.29	5.74	7.89	2.81	7.37	22.045
5	5.80	-7.98	2.63	10.21	6.00	5.60	10.33	13.19	1.69	13.08	7.970
6	59.80	3.05	2.22	59.92	179.41	-0.23	-0.78	179.41	179.01	11.94	300.605
7	7.58	0.38	1.18	7.68	2.53	0.00	-0.55	2.59	2.41	0.94	62.550
8	2.11	12.43	0.40	12.62	-0.78	-25.40	0.00	25.41	-25.16	3.57	44.616
9	3.01	0.60	6.60	7.28	-0.73	0.01	4.00	4.07	3.33	2.34	22.658
10	13.60	1.32	-12.94	18.82	4.00	-0.55	-7.00	8.08	7.66	2.56	138.595
11	12.04	1.10	4.74	12.98	34.51	-0.55	-3.74	34.72	30.59	16.42	10.268
12	3.01	8.99	1.36	9.58	-0.73	-3.15	0.12	3.24	-3.17	0.65	140.156
13	12.04	10.60	3.75	16.47	34.51	6.00	-2.34	35.11	28.55	20.43	13.282
14	4.69	3.89	5.80	8.42	15.49	-1.18	2.00	15.66	9.47	12.47	5.678
15	0.91	1.35	-0.81	1.82	-0.83	-0.61	1.13	1.53	-1.37	0.67	4.904
16	0.44	9.16	5.77	10.83	-0.28	4.58	-31.78	32.11	-13.06	29.34	4.001
17	9.40	4.74	1.10	10.58	4.00	-3.74	-0.55	5.50	1.82	5.19	21.569
18	10.96	6.12	4.87	13.46	-6.50	-2.68	-0.90	7.08	-6.83	1.88	96.631
19	-2.04	10.03	-2.04	10.43	-9.31	20.92	-9.31	24.72	23.74	6.86	15.863
20	4.21	1.46	0.30	4.47	-0.50	0.30	0.00	0.58	-0.37	0.45	44.464
21	5.02	5.00	-7.51	10.33	4.66	-5.00	-10.46	12.49	7.45	10.03	10.639
22	18.28	0.50	-0.89	18.31	51.71	0.01	0.87	51.72	51.59	3.66	91.625
23	5.20	-5.33	1.35	7.57	4.00	-32.28	0.09	32.53	25.50	20.20	2.834
24	0.49	5.00	10.27	11.43	-0.29	-5.00	5.14	7.17	2.42	6.76	19.356
25	0.30	13.94	11.90	18.34	0.00	7.00	13.91	15.57	14.35	6.04	55.657
26	1.38	13.88	0.27	13.95	-0.55	5.03	0.00	5.06	4.95	1.05	185.376
27	5.80	0.45	4.44	7.32	1.45	0.00	-2.47	2.86	-0.35	2.84	18.862
28	15.00	9.77	-12.61	21.90	4.00	3.26	30.38	30.81	-13.30	27.79	17.250
29	4.74	-1.13	-4.62	6.71	-3.74	1.08	21.90	22.24	-17.89	13.22	3.409
30	4.74	0.40	-6.14	7.76	-2.49	0.00	-16.63	16.81	11.62	12.15	4.961