

## Естественные координаты

Точка движется по плоской кривой  $y = y(x)$  с постоянной скоростью  $v$ . Определить ускорение точки, радиус кривизны траектории и косинус угла наклона касательной к траектории с осью  $ox$  при заданном значении  $x$ .

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<p><b>Задача 3.1</b></p> $y = \left(\frac{x}{8}\right)^6 + \frac{60}{x},$ <p style="text-align: center;"><math>v = 3 \text{ м/с}, x = 6 \text{ м.}</math></p>	<p><b>Задача 3.2</b></p> $y = 5x - 4 \arctan \frac{x}{5},$ <p style="text-align: center;"><math>v = 2 \text{ м/с}, x = 1 \text{ м.}</math></p>	<p><b>Задача 3.3</b></p> $y = x(\sqrt{x+1} + 4)/7,$ <p style="text-align: center;"><math>v = 20 \text{ м/с}, x = 5 \text{ м.}</math></p>
<p><b>Задача 3.4</b></p> $y = -3x^2 + 14x + 4,$ <p style="text-align: center;"><math>v = 1 \text{ м/с}, x = 2 \text{ м.}</math></p>	<p><b>Задача 3.5</b></p> $y = \frac{x(4 + \sin(x/3))}{4},$ <p style="text-align: center;"><math>v = 5 \text{ м/с}, x = 6 \text{ м.}</math></p>	<p><b>Задача 3.6</b></p> $y = \frac{x}{5}(\ln(x+2) + 4),$ <p style="text-align: center;"><math>v = 4 \text{ м/с}, x = 1 \text{ м.}</math></p>
<p><b>Задача 3.7</b></p> $y = 4x \cos \frac{x+1}{5},$ <p style="text-align: center;"><math>v = 2 \text{ м/с}, x = 3 \text{ м.}</math></p>	<p><b>Задача 3.8</b></p> $y = x(\sqrt{x+2} + 5)/4,$ <p style="text-align: center;"><math>v = 13 \text{ м/с}, x = 2 \text{ м.}</math></p>	<p><b>Задача 3.9</b></p> $y = \frac{x}{5}e^{(x+4)/3},$ <p style="text-align: center;"><math>v = 4 \text{ м/с}, x = 3 \text{ м.}</math></p>
<p><b>Задача 3.10</b></p> $y = 3e^{x/7} - 3x,$ <p style="text-align: center;"><math>v = 10 \text{ м/с}, x = 4 \text{ м.}</math></p>	<p><b>Задача 3.11</b></p> $y = -4 \cos^2 \frac{x}{2} + \frac{3}{x},$ <p style="text-align: center;"><math>v = 2 \text{ м/с}, x = 5 \text{ м.}</math></p>	<p><b>Задача 3.12</b></p> $y = \frac{1}{6} \left( e^{x/2} + 6e^{-x/2} \right),$ <p style="text-align: center;"><math>v = 4 \text{ м/с}, x = 5 \text{ м.}</math></p>
<p><b>Задача 3.13</b></p> $y = \frac{35}{\sin(x/5) + 2},$ <p style="text-align: center;"><math>v = 3 \text{ м/с}, x = 3 \text{ м.}</math></p>	<p><b>Задача 3.14</b></p> $y = \frac{1}{74} \left( e^{x/2} + 6e^{-x/2} \right),$ <p style="text-align: center;"><math>v = 4 \text{ м/с}, x = 10 \text{ м.}</math></p>	<p><b>Задача 3.15</b></p> $y = 2x - 3 \arctan \frac{x}{3},$ <p style="text-align: center;"><math>v = 2 \text{ м/с}, x = 3 \text{ м.}</math></p>
<p><b>Задача 3.16</b></p> $y = \frac{x(6 + \cos(x/3))}{4},$ <p style="text-align: center;"><math>v = 8 \text{ м/с}, x = 6 \text{ м.}</math></p>	<p><b>Задача 3.17</b></p> $y = \frac{x(5 + \sin(x/3))}{5},$ <p style="text-align: center;"><math>v = 6 \text{ м/с}, x = 6 \text{ м.}</math></p>	<p><b>Задача 3.18</b></p> $y = \frac{x^2}{4} + \sin \frac{x}{8},$ <p style="text-align: center;"><math>v = 5 \text{ м/с}, x = 2 \text{ м.}</math></p>
<p><b>Задача 3.19</b></p> $y = \frac{21}{x+3},$ <p style="text-align: center;"><math>v = 5 \text{ м/с}, x = 1 \text{ м.}</math></p>	<p><b>Задача 3.20</b></p> $y = 3 \cos^2 \frac{x}{3} + 2x,$ <p style="text-align: center;"><math>v = 2 \text{ м/с}, x = 1 \text{ м.}</math></p>	<p><b>Задача 3.21</b></p> $y = 4x \cos \frac{x+4}{10},$ <p style="text-align: center;"><math>v = 2 \text{ м/с}, x = 5 \text{ м.}</math></p>
<p><b>Задача 3.22</b></p> $y = \frac{x}{6}(\ln(x+2) + 5),$ <p style="text-align: center;"><math>v = 4 \text{ м/с}, x = 1 \text{ м.}</math></p>	<p><b>Задача 3.23</b></p> $y = \frac{x^2}{6} + 6 \sin \frac{x}{14},$ <p style="text-align: center;"><math>v = 6 \text{ м/с}, x = 4 \text{ м.}</math></p>	<p><b>Задача 3.24</b></p> $y = \frac{x(7 + \cos(x/3))}{5},$ <p style="text-align: center;"><math>v = 9 \text{ м/с}, x = 6 \text{ м.}</math></p>

<p><b>Задача 3.25</b> <span style="float: right;"> </span></p> $y = \cos \frac{x}{14} + 6 \sin \frac{x}{14},$ $v = 27 \text{ м/с}, x = 4 \text{ м.}$	<p><b>Задача 3.26</b> <span style="float: right;"> </span></p> $y = \frac{83}{x+2},$ $v = 6 \text{ м/с}, x = 6 \text{ м.}$	<p><b>Задача 3.27</b> <span style="float: right;"> </span></p> $y = \frac{x}{18} (e^{x+1} + 3),$ $v = 2 \text{ м/с}, x = 1 \text{ м.}$
<p><b>Задача 3.28</b> <span style="float: right;"> </span></p> $y = -3x^2 + 20x + 4,$ $v = 1 \text{ м/с}, x = 3 \text{ м.}$	<p><b>Задача 3.29</b> <span style="float: right;"> </span></p> $y = -2x^2 + 6x + 3,$ $v = 1 \text{ м/с}, x = 1 \text{ м.}$	<p><b>Задача 3.30</b> <span style="float: right;"> </span></p> $y = \frac{x}{20} e^{(x+3)/2},$ $v = 4 \text{ м/с}, x = 3 \text{ м.}$

**Естественные координаты**

	$y'$	$y''$	$v_x$	$v_y$	$\cos(\alpha)$	$a_x$	$a_y$	$a$	$R$
1	-1.489	0.704	1.673	-2.490	0.558	0.912	0.612	1.098	8.194
2	4.231	0.059	0.460	1.946	0.230	-0.003	0.001	0.003	1388.542
3	1.067	0.046	13.675	14.594	0.684	-4.308	4.037	5.904	67.748
4	2.000	-6.000	0.447	0.894	0.447	0.480	-0.240	0.537	1.863
5	1.019	-0.221	3.502	3.569	0.700	1.354	-1.329	1.897	13.179
6	1.086	0.111	2.709	2.943	0.677	-0.406	0.374	0.552	28.973
7	1.065	-1.482	1.369	1.458	0.684	1.386	-1.301	1.901	2.104
8	1.875	0.109	6.118	11.471	0.471	-1.700	0.907	1.926	87.732
9	4.125	2.062	0.942	3.887	0.236	-0.419	0.102	0.432	37.073
10	-2.241	0.108	4.075	-9.132	0.407	0.670	0.299	0.734	136.323
11	-2.038	0.615	0.881	-1.795	0.441	0.189	0.093	0.210	19.009
12	0.974	0.528	2.865	2.791	0.716	-2.167	2.225	3.106	5.152
13	-0.878	0.233	2.254	-1.980	0.751	0.588	0.669	0.890	10.109
14	1.003	0.502	2.825	2.832	0.706	-2.001	1.996	2.826	5.661
15	1.500	0.167	1.109	1.664	0.555	-0.095	0.063	0.114	35.154
16	0.941	-0.082	5.825	5.483	0.728	1.392	-1.479	2.031	31.514
17	1.015	-0.177	4.210	4.275	0.702	1.566	-1.542	2.198	16.379
18	1.121	0.496	3.328	3.731	0.666	-2.730	2.435	3.658	6.834
19	-1.313	0.656	3.030	-3.977	0.606	2.905	2.213	3.652	6.846
20	1.382	-0.524	1.173	1.620	0.586	0.342	-0.248	0.422	9.469
21	0.920	-0.751	1.472	1.354	0.736	0.811	-0.882	1.198	3.340
22	1.072	0.093	2.729	2.925	0.682	-0.344	0.321	0.470	34.027
23	1.745	0.325	2.984	5.205	0.497	-1.247	0.715	1.438	25.040
24	0.953	-0.066	6.515	6.209	0.724	1.394	-1.463	2.020	40.092
25	0.391	-0.014	25.146	9.834	0.931	2.900	-7.416	7.963	91.544
26	-1.297	0.324	3.664	-4.751	0.611	2.105	1.623	2.658	13.546
27	0.988	1.232	1.423	1.405	0.711	-1.247	1.262	1.774	2.255
28	2.000	-6.000	0.447	0.894	0.447	0.480	-0.240	0.537	1.863
29	2.000	-4.000	0.447	0.894	0.447	0.320	-0.160	0.358	2.795
30	2.511	1.757	1.480	3.716	0.370	-1.324	0.527	1.425	11.231