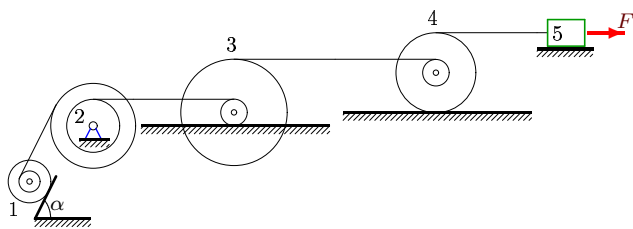


## Кинетическая энергия системы. Приведенные массы

Механическая система, состоящая из пяти тел 1, 2, 3, 4 и 5, движется под действием внешних сил. Заданы радиусы цилиндров и блоков. Радиусы инерции  $\rho$  даны для блоков, цилиндры считать однородными. Горизонтальный стержень, находящийся в зацеплении с блоками, считать невесомым. Массы даны в килограммах, радиусы — в сантиметрах. Вычислить приведенную массу системы  $\mu$  в формуле  $T = \mu v_1^2/2$ , где  $v_1$  — скорость груза 1 (или центра цилиндра 1).

Курсанов М.Н. Задачи по теоретической механике с решениями в **Maple** 11. — М.: ФИЗМАТЛИТ, 2010. — 264 с. (с.111)

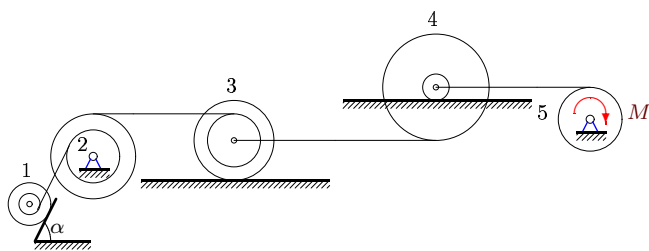
### Задача D-33.1.



$$\begin{aligned}R_1 &= 2, r_1 = 1, \rho_1 = 1, \\R_2 &= 3, r_2 = 2, \rho_2 = 3, \\R_3 &= 4, r_3 = 1, \rho_3 = 3, \\R_4 &= 3, r_4 = 1, \rho_4 = 2, \\m_1 &= 4, m_2 = 20, \\m_3 &= 8, m_4 = 64, \\m_5 &= 16.\end{aligned}$$

Задача D-33.2.

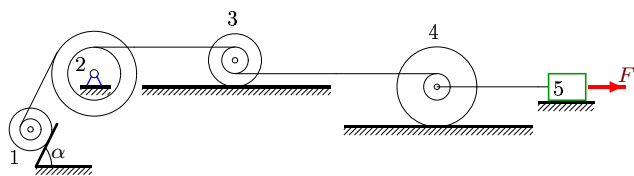
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 2, \rho_3 = 2, \\
 R_4 &= 4, r_4 = 1, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 64, \\
 m_3 &= 100, m_4 = 15, \\
 m_5 &= 100.
 \end{aligned}$$

Задача D-33.3.

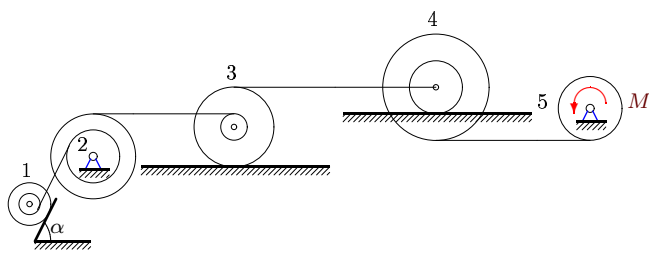
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 2, r_3 = 1, \rho_3 = 1, \\
 R_4 &= 3, r_4 = 1, \rho_4 = 2, \\
 m_1 &= 12, m_2 = 20, \\
 m_3 &= 54, m_4 = 144, \\
 m_5 &= 64.
 \end{aligned}$$

Задача D-33.4.

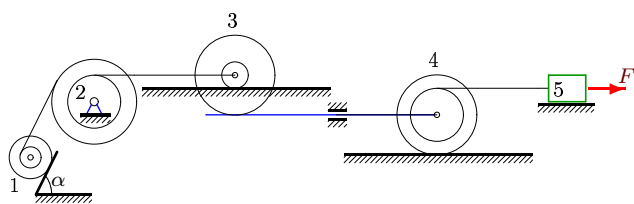
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 4, r_4 = 2, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 80, \\
 m_3 &= 64, m_4 = 48, \\
 m_5 &= 16.
 \end{aligned}$$

Задача D-33.5.

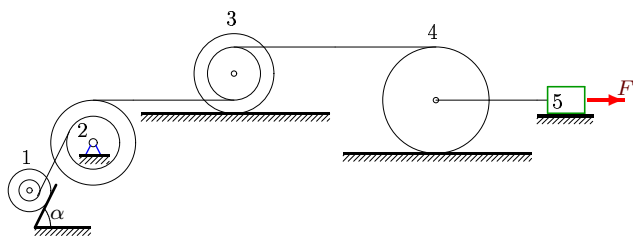
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 3, r_4 = 2, \rho_4 = 2, \\
 m_1 &= 4, m_2 = 24, \\
 m_3 &= 4, m_4 = 27, \\
 m_5 &= 18.
 \end{aligned}$$

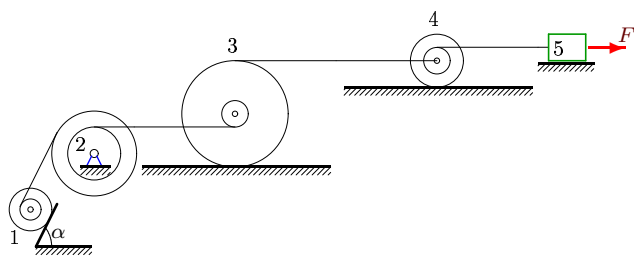
Задача D-33.6.

19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 3, r_3 = 2, \rho_3 = 2, \\
 R_4 &= 4, \\
 m_1 &= 4, m_2 = 48, \\
 m_3 &= 4, m_4 = 24, \\
 m_5 &= 8.
 \end{aligned}$$

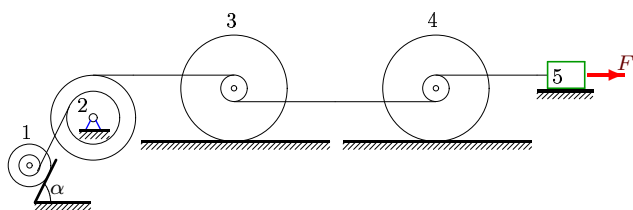
Задача D-33.7.



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 2, r_4 = 1, \rho_4 = 1, \\
 m_1 &= 4, m_2 = 4, \\
 m_3 &= 36, m_4 = 27, \\
 m_5 &= 2.
 \end{aligned}$$

Задача D-33.8.

19

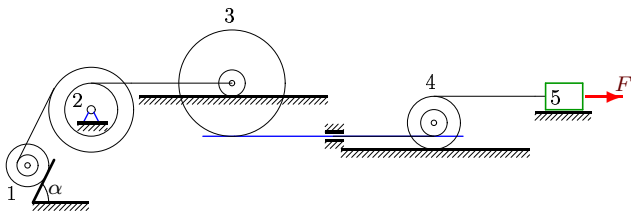


$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 4, r_4 = 1, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 48, \\
 m_3 &= 4, m_4 = 3, \\
 m_5 &= 2.
 \end{aligned}$$



Задача D-33.9.

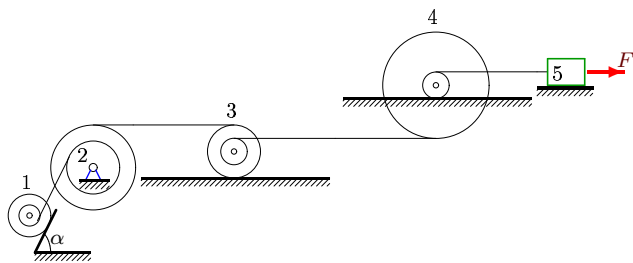
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 2, r_4 = 1, \rho_4 = 1, \\
 m_1 &= 20, m_2 = 4, \\
 m_3 &= 8, m_4 = 7, \\
 m_5 &= 1.
 \end{aligned}$$

Задача D-33.10.

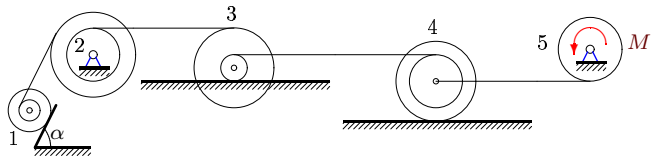
19



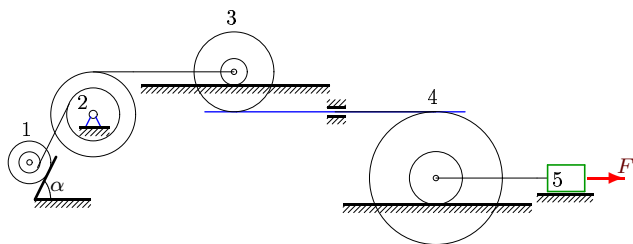
$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 2, r_3 = 1, \rho_3 = 1, \\
 R_4 &= 4, r_4 = 1, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 48, \\
 m_3 &= 64, m_4 = 24, \\
 m_5 &= 8.
 \end{aligned}$$

Задача D-33.11.

19



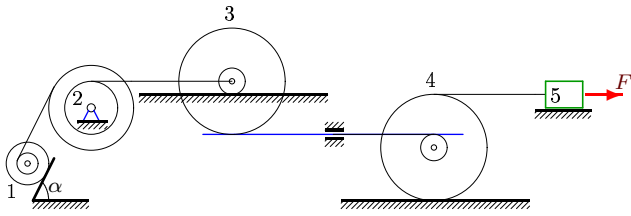
$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 3, r_4 = 2, \rho_4 = 2, \\
 m_1 &= 4, m_2 = 24, \\
 m_3 &= 64, m_4 = 100, \\
 m_5 &= 200.
 \end{aligned}$$



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 5, r_4 = 2, \rho_4 = 4, \\
 m_1 &= 20, m_2 = 64, \\
 m_3 &= 8, m_4 = 343, \\
 m_5 &= 294.
 \end{aligned}$$

Задача D-33.13.

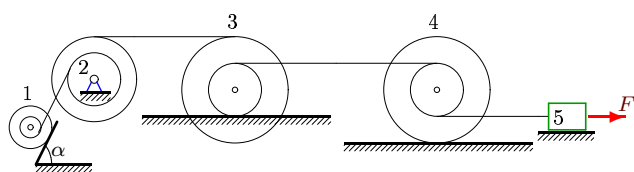
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 4, r_4 = 1, \rho_4 = 3, \\
 m_1 &= 12, m_2 = 16, \\
 m_3 &= 6, m_4 = 5, \\
 m_5 &= 25.
 \end{aligned}$$

Задача D-33.14.

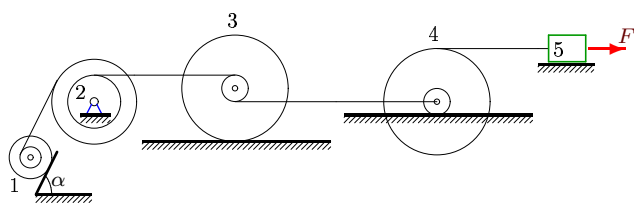
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, r_3 = 2, \rho_3 = 3, \\
 R_4 &= 4, r_4 = 2, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 32, \\
 m_3 &= 144, m_4 = 243, \\
 m_5 &= 162.
 \end{aligned}$$

Задача D-33.15.

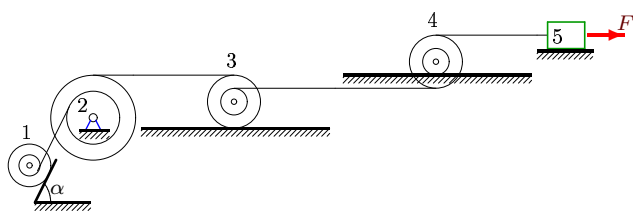
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 4, r_4 = 1, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 16, \\
 m_3 &= 4, m_4 = 15, \\
 m_5 &= 2.
 \end{aligned}$$

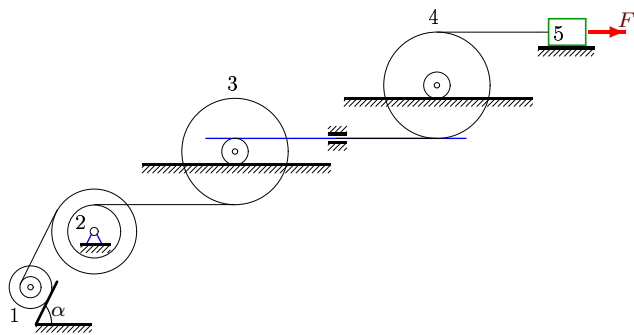
Задача D-33.16.

19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 2, r_3 = 1, \rho_3 = 1, \\
 R_4 &= 2, r_4 = 1, \rho_4 = 1, \\
 m_1 &= 4, m_2 = 16, \\
 m_3 &= 64, m_4 = 24, \\
 m_5 &= 32.
 \end{aligned}$$

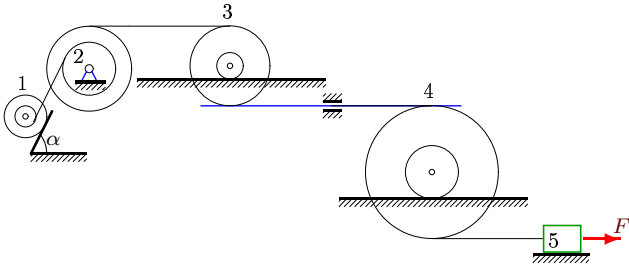




$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 4, r_4 = 1, \rho_4 = 3, \\
 m_1 &= 20, m_2 = 12, \\
 m_3 &= 72, m_4 = 567, \\
 m_5 &= 486.
 \end{aligned}$$

Задача D-33.18.

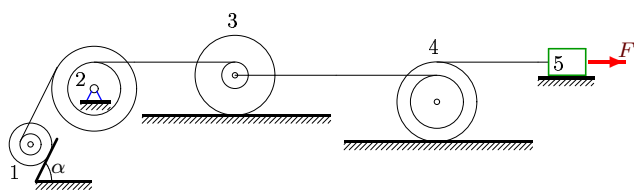
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 5, r_4 = 2, \rho_4 = 4, \\
 m_1 &= 20, m_2 = 64, \\
 m_3 &= 128, m_4 = 343, \\
 m_5 &= 196.
 \end{aligned}$$

Задача D-33.19.

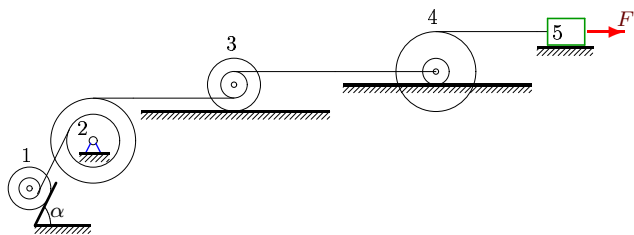
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 3, r_4 = 2, \rho_4 = 2, \\
 m_1 &= 20, m_2 = 4, \\
 m_3 &= 128, m_4 = 400, \\
 m_5 &= 100.
 \end{aligned}$$

Задача D-33.20.

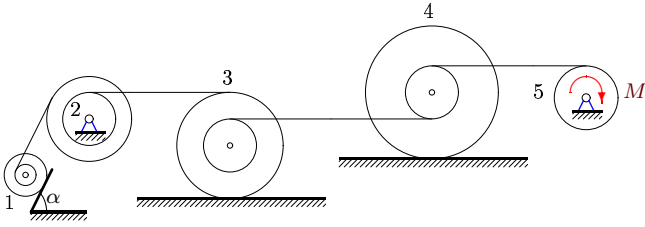
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 2, r_3 = 1, \rho_3 = 1, \\
 R_4 &= 3, r_4 = 1, \rho_4 = 2, \\
 m_1 &= 4, m_2 = 32, \\
 m_3 &= 4, m_4 = 3, \\
 m_5 &= 1.
 \end{aligned}$$

Задача D-33.21.

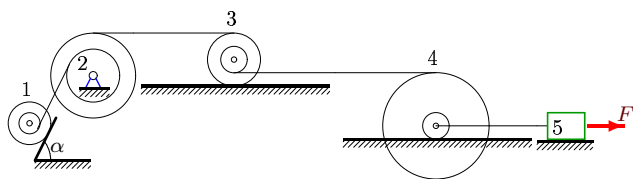
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, r_3 = 2, \rho_3 = 3, \\
 R_4 &= 5, r_4 = 2, \rho_4 = 4, \\
 m_1 &= 4, m_2 = 16, \\
 m_3 &= 256, m_4 = 48, \\
 m_5 &= 64.
 \end{aligned}$$

Задача D-33.22.

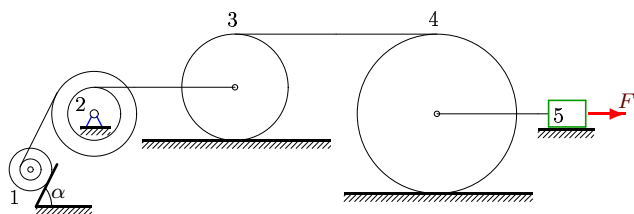
19



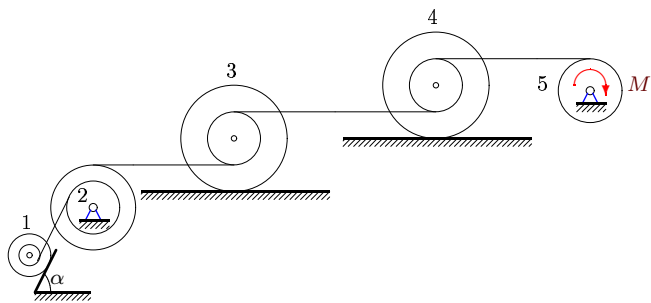
$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 2, r_3 = 1, \rho_3 = 1, \\
 R_4 &= 4, r_4 = 1, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 64, \\
 m_3 &= 64, m_4 = 120, \\
 m_5 &= 400.
 \end{aligned}$$

Задача D-33.23.

19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, \\
 R_4 &= 6, \\
 m_1 &= 4, m_2 = 12, \\
 m_3 &= 8, m_4 = 6, \\
 m_5 &= 2.
 \end{aligned}$$

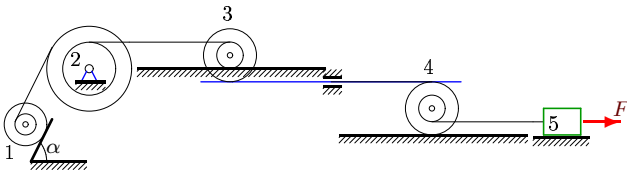


$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, r_3 = 2, \rho_3 = 3, \\
 R_4 &= 4, r_4 = 2, \rho_4 = 3, \\
 m_1 &= 16, m_2 = 80, \\
 m_3 &= 28, m_4 = 4, \\
 m_5 &= 10.
 \end{aligned}$$



Задача D-33.25.

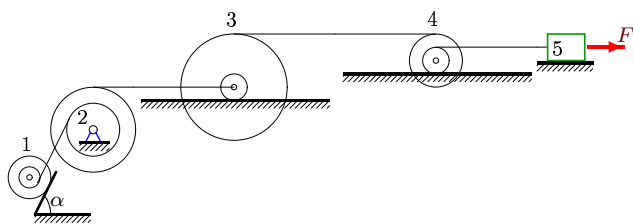
19



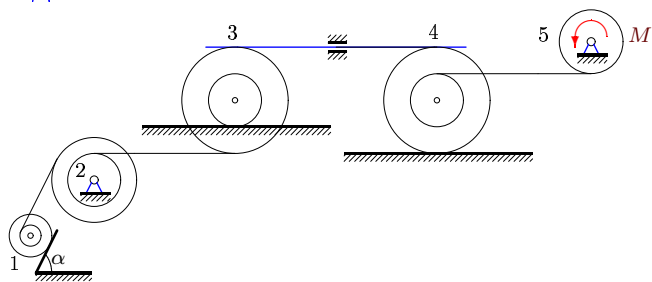
$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 2, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 2, r_3 = 1, \rho_3 = 1, \\
 R_4 &= 2, r_4 = 1, \rho_4 = 1, \\
 m_1 &= 4, m_2 = 24, \\
 m_3 &= 8, m_4 = 192, \\
 m_5 &= 128.
 \end{aligned}$$

Задача D-33.26.

19



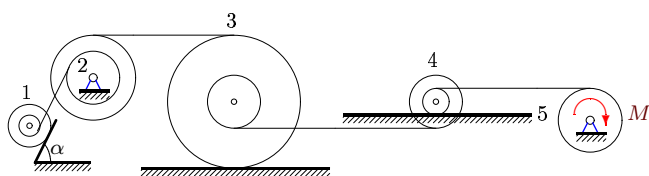
$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 2, r_4 = 1, \rho_4 = 1, \\
 m_1 &= 12, m_2 = 96, \\
 m_3 &= 6, m_4 = 45, \\
 m_5 &= 36.
 \end{aligned}$$



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, r_3 = 2, \rho_3 = 3, \\
 R_4 &= 4, r_4 = 2, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 8, \\
 m_3 &= 16, m_4 = 64, \\
 m_5 &= 64.
 \end{aligned}$$

Задача D-33.28.

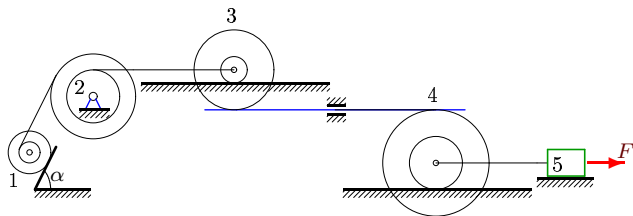
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 5, r_3 = 2, \rho_3 = 4, \\
 R_4 &= 2, r_4 = 1, \rho_4 = 1, \\
 m_1 &= 16, m_2 = 96, \\
 m_3 &= 100, m_4 = 300, \\
 m_5 &= 250.
 \end{aligned}$$

Задача D-33.29.

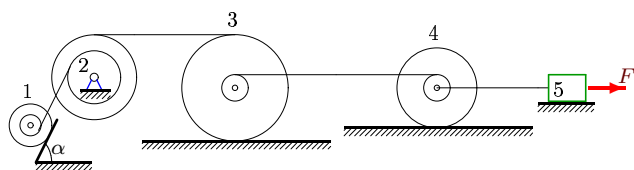
19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 3, r_2 = 2, \rho_2 = 2, \\
 R_3 &= 3, r_3 = 1, \rho_3 = 2, \\
 R_4 &= 4, r_4 = 2, \rho_4 = 3, \\
 m_1 &= 4, m_2 = 20, \\
 m_3 &= 4, m_4 = 27, \\
 m_5 &= 18.
 \end{aligned}$$

Задача D-33.30.

19



$$\begin{aligned}
 R_1 &= 2, r_1 = 1, \rho_1 = 1, \\
 R_2 &= 4, r_2 = 2, \rho_2 = 3, \\
 R_3 &= 4, r_3 = 1, \rho_3 = 3, \\
 R_4 &= 3, r_4 = 1, \rho_4 = 2, \\
 m_1 &= 4, m_2 = 80, \\
 m_3 &= 256, m_4 = 1024, \\
 m_5 &= 1024.
 \end{aligned}$$



**Ответы.****Кинетическая энергия системы. Приведенные массы** 17.05.2015

№	$\mu_1$	$\mu_2$	$\mu_3$	$\mu_4$	$\mu_5$	$\sum \mu_k$
1	5	45	20	325	225	620
2	8	16	52	6	2	84
3	24	45	30	13	4	116
4	5	20	52	351	18	446
5	5	54	20	156	200	435
6	8	27	52	225	50	362
7	5	9	100	240	32	386
8	5	27	4	3	2	41
9	25	9	80	315	144	573
10	8	12	20	15	2	57
11	5	54	20	13	9	101
12	25	16	40	560	96	737
13	15	36	60	45	576	732
14	5	18	52	75	8	158
15	5	16	4	54	18	97
16	8	4	20	27	162	221
17	25	12	80	280	600	997
18	25	16	40	35	9	125
19	25	9	104	117	81	336
20	8	8	20	135	144	315
21	5	36	100	123	98	362
22	8	16	20	3	1	48
23	5	27	12	9	2	55
24	20	45	175	225	405	870
25	8	54	4	15	2	83
26	15	24	60	250	400	749
27	5	18	52	225	162	462
28	20	24	41	54	45	184
29	5	20	20	39	8	92
30	5	45	100	325	225	700

D-33 файл о33d19F