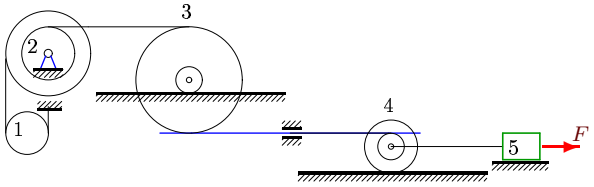
Теорема об изменении кинетической энергии

Механическая система, состоящая из пяти тел 1, 2, 3, 4 и 5, движется под действием внешних сил. Заданы радиусы цилиндров и блоков. Радиусы инерции ρ даны для блоков, цилиндры считать однородными. Горизонтальный стержень, находящийся в зацеплении с блоками, считать невесомым. Массы даны в килограммах, радиусы — в сантиметрах. Найти математическое ожидание скорости груза 1 или центра цилиндра (блока) 1, который опустится по вертикали вниз на случайную величину S с рядом распределения $p = [0.1, 0.4, 0.3, 0.2]$. Приближенно принять $g = 9.81$ м/с^2.

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

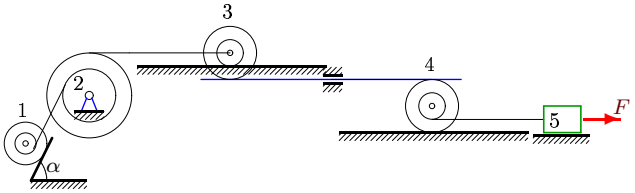
Задача 24.1. *Баханович Иван*



$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 2$, $m_2 = 4$,
$m_3 = 20$, $m_4 = 15$,
$m_5 = 50$.

$S = [4.3, 4.4, 4.7, 4.9]$ м.

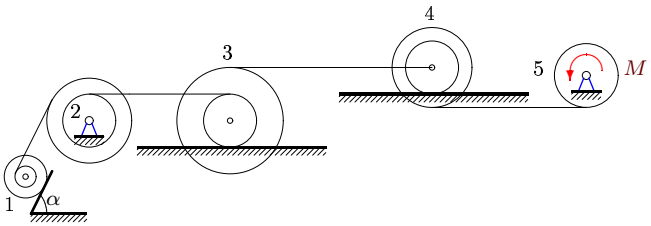
Задача 24.2. *Беленов Степан*



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 96$,
$m_3 = 4$, $m_4 = 48$,
$m_5 = 32$.

$S = [2.2, 2.5, 2.7, 2.8]$ м.

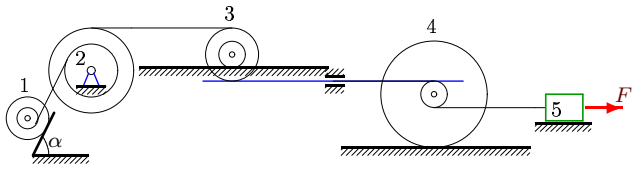
Задача 24.3. *Дони Владлен*



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 4$, $r_3 = 2$, $\rho_3 = 3$,
$R_4 = 3$, $r_4 = 2$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 4$,
$m_3 = 64$, $m_4 = 6$,
$m_5 = 64$.

$S = [9.2, 9.4, 9.7, 9.9]$ м.

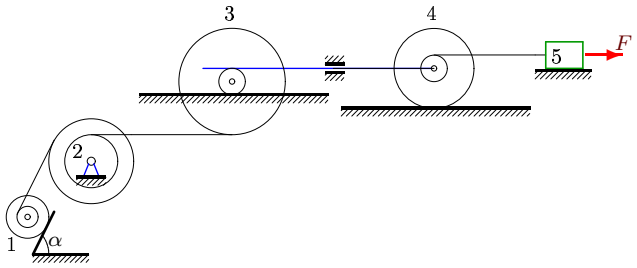
Задача 24.4. *Замашкин Валерий*



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 2$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 2$, $r_3 = 1$, $\rho_3 = 1$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 20$, $m_2 = 48$,
$m_3 = 72$, $m_4 = 63$,
$m_5 = 150$.

$S = [5.3, 5.4, 5.7, 5.8]$ м.

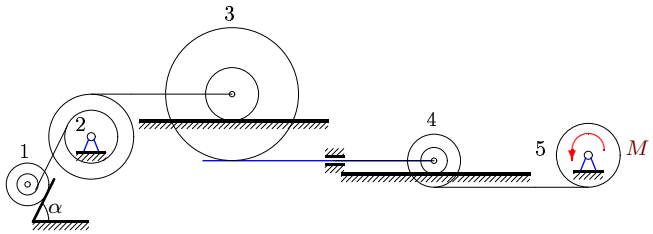
Задача 24.5. *Косогоров Алексей*



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 1$, $\rho_3 = 3$,
$R_4 = 3$, $r_4 = 1$, $\rho_4 = 2$,
$m_1 = 4$, $m_2 = 20$,
$m_3 = 36$, $m_4 = 243$,
$m_5 = 162$.

$S = [4.3, 4.4, 4.7, 4.9]$ м.

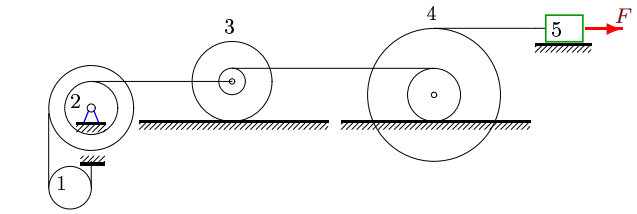
Задача 24.6. *Малышев Илья*



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 2$, $r_4 = 1$, $\rho_4 = 1$,
$m_1 = 4$, $m_2 = 16$,
$m_3 = 4$, $m_4 = 6$,
$m_5 = 16$.

$S = [9.2, 9.5, 9.6, 9.9]$ м.

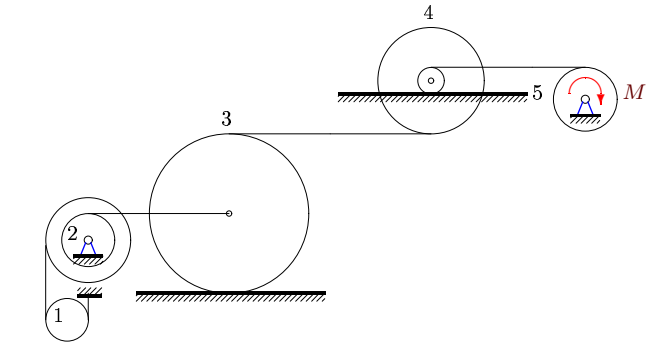
Задача 24.7. *Мордин Антон*



$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 3$, $r_3 = 1$, $\rho_3 = 2$,
$R_4 = 5$, $r_4 = 2$, $\rho_4 = 4$,
$m_1 = 2$, $m_2 = 16$,
$m_3 = 36$, $m_4 = 27$,
$m_5 = 18$.

$S = [6.3, 6.4, 6.7, 6.9]$ м.

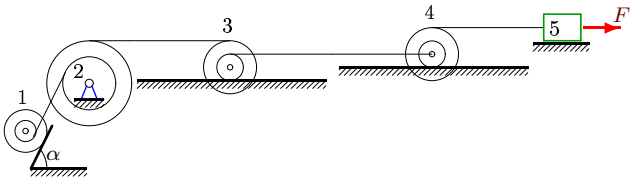
Задача 24.8. *Носенко Алексей*



$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 6,$
$R_4 = 4,\ r_4 = 1,\ \rho_4 = 3,$
$m_1 = 8,\ m_2 = 16,$
$m_3 = 14,\ m_4 = 54,$
$m_5 = 90.$

$S = [10.2, 10.4, 10.7, 10.8]$ м.

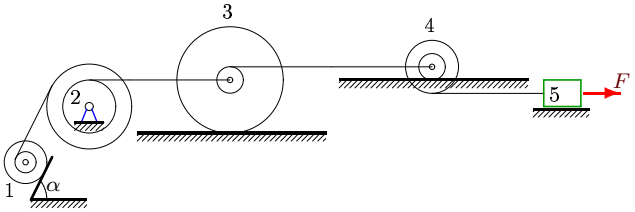
Задача 24.9. *Хурэлбаатар Очхуу*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 2,\ r_3 = 1,\ \rho_3 = 1,$
$R_4 = 2,\ r_4 = 1,\ \rho_4 = 1,$
$m_1 = 4,\ m_2 = 96,$
$m_3 = 36,\ m_4 = 27,$
$m_5 = 2.$

$S = [7.3, 7.4, 7.7, 7.9]$ м.

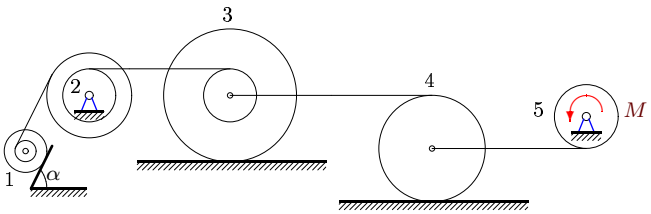
Задача 24.10. *Рейханов Людвиг*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 3,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 4,\ r_3 = 1,\ \rho_3 = 3,$
$R_4 = 2,\ r_4 = 1,\ \rho_4 = 1,$
$m_1 = 4,\ m_2 = 24,$
$m_3 = 64,\ m_4 = 24,$
$m_5 = 32.$

$S = [9.3, 9.4, 9.7, 9.9]$ м.

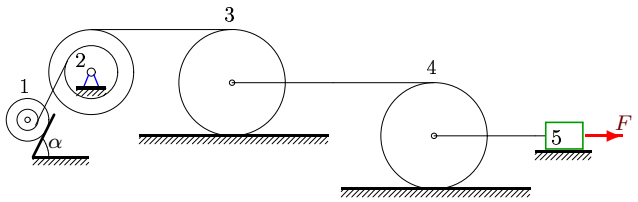
Задача 24.11. *Стручков Юрий*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 3,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 5,\ r_3 = 2,\ \rho_3 = 4,$
$R_4 = 4,$
$m_1 = 4,\ m_2 = 20,$
$m_3 = 196,\ m_4 = 392,$
$m_5 = 392.$

$S = [3.3, 3.4, 3.6, 3.8]$ м.

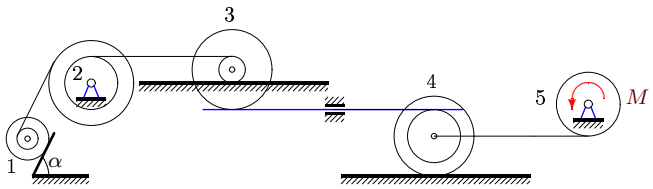
Задача 24.12. *Учаев Роман*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 4,$
$R_4 = 4,$
$m_1 = 12,\ m_2 = 80,$
$m_3 = 48,\ m_4 = 160,$
$m_5 = 64.$

$S = [3.3, 3.5, 3.6, 3.8]$ м.

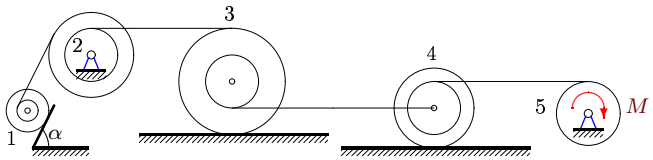
Задача 24.13. *Шестаков Виктор*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 3,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 3,\ r_3 = 1,\ \rho_3 = 2,$
$R_4 = 3,\ r_4 = 2,\ \rho_4 = 2,$
$m_1 = 4,\ m_2 = 24,$
$m_3 = 16,\ m_4 = 75,$
$m_5 = 100.$

$S = [4.2, 4.4, 4.6, 4.8]$ м.

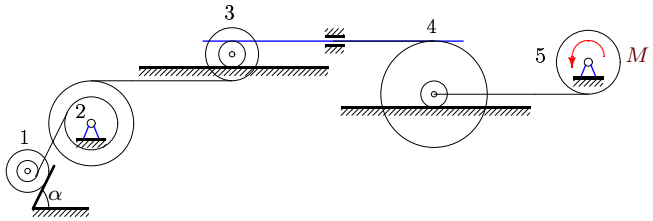
Задача 24.14. *Пахомов В. А.*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 3,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 4,\ r_3 = 2,\ \rho_3 = 3,$
$R_4 = 3,\ r_4 = 2,\ \rho_4 = 2,$
$m_1 = 4,\ m_2 = 24,$
$m_3 = 256,\ m_4 = 144,$
$m_5 = 288.$

$S = [4.3, 4.4, 4.6, 4.9]$ м.

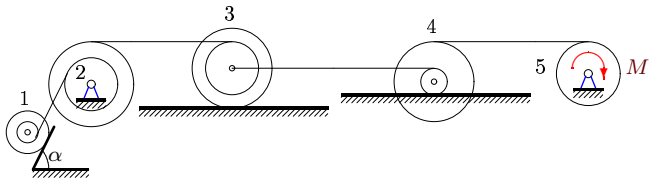
Задача 24.15. *Дагиянов О.*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 2,\ r_3 = 1,\ \rho_3 = 1,$
$R_4 = 4,\ r_4 = 1,\ \rho_4 = 3,$
$m_1 = 4,\ m_2 = 48,$
$m_3 = 4,\ m_4 = 15,$
$m_5 = 100.$

$S = [7.2, 7.4, 7.6, 7.9]$ м.

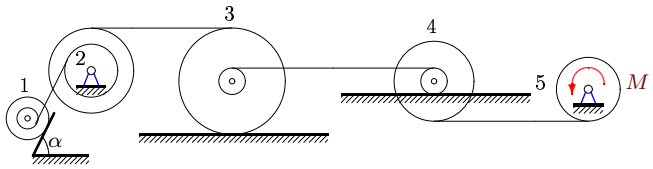
Задача 24.16. *Ерзунов И.А.*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 3,\ r_3 = 2,\ \rho_3 = 2,$
$R_4 = 3,\ r_4 = 1,\ \rho_4 = 2,$
$m_1 = 4,\ m_2 = 32,$
$m_3 = 100,\ m_4 = 60,$
$m_5 = 100.$

$S = [6.3, 6.4, 6.6, 6.9]$ м.

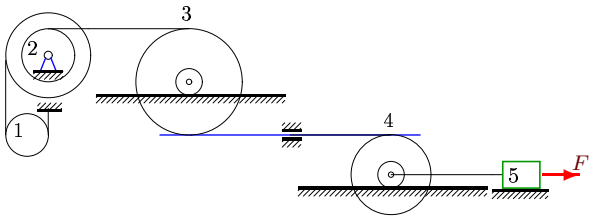
Задача 24.17. *Dai Qiao*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 4,\ r_3 = 1,\ \rho_3 = 3,$
$R_4 = 3,\ r_4 = 1,\ \rho_4 = 2,$
$m_1 = 4,\ m_2 = 80,$
$m_3 = 256,\ m_4 = 256,$
$m_5 = 128.$

$S = [10.2, 10.4, 10.6, 10.8]$ м.

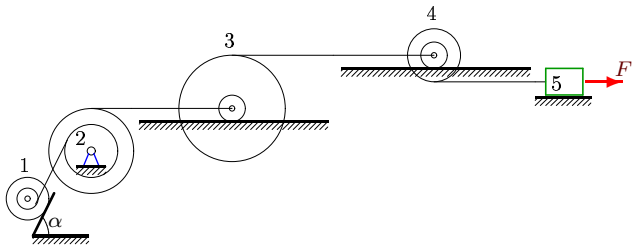
Задача 24.18. *Арманду Э.*



$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 4,\ r_3 = 1,\ \rho_3 = 3,$
$R_4 = 3,\ r_4 = 1,\ \rho_4 = 2,$
$m_1 = 2,\ m_2 = 8,$
$m_3 = 20,\ m_4 = 240,$
$m_5 = 400.$

$S = [7.3, 7.4, 7.7, 7.9]$ м.

Задача 24.19. *Сунь Цзясюань*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 4,\ r_3 = 1,\ \rho_3 = 3,$
$R_4 = 2,\ r_4 = 1,\ \rho_4 = 1,$
$m_1 = 4,\ m_2 = 96,$
$m_3 = 4,\ m_4 = 3,$
$m_5 = 2.$

$S = [9.3, 9.5, 9.6, 9.9]$ м.