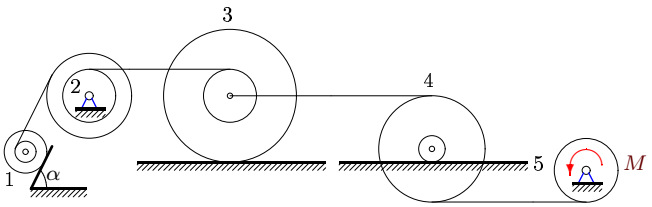
Теорема об изменении кинетической энергии

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)

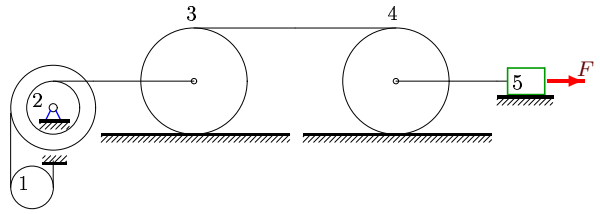
Задача L-24.1. *Бирбасов Арсений*



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 3$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 4$, $m_2 = 16$,
$m_3 = 196$, $m_4 = 147$,
$m_5 = 196$.

$S = [8.2, 8.4, 8.7, 8.9]$ м.

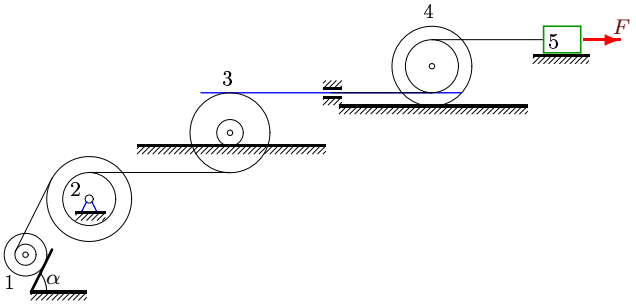
Задача L-24.2. *Богачев Антон*



$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$,
$R_4 = 4$,
$m_1 = 10$, $m_2 = 16$,
$m_3 = 16$, $m_4 = 14$,
$m_5 = 6$.

$S = [3.3, 3.4, 3.7, 3.8]$ м.

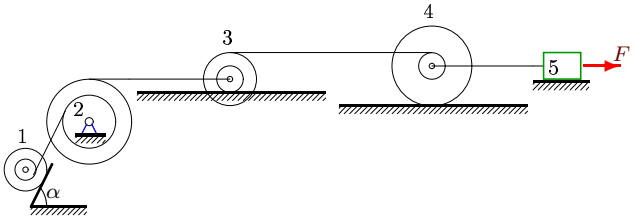
Задача L-24.3. *Вальтер Александр*



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

$S = [5.3, 5.5, 5.6, 5.9]$ м.

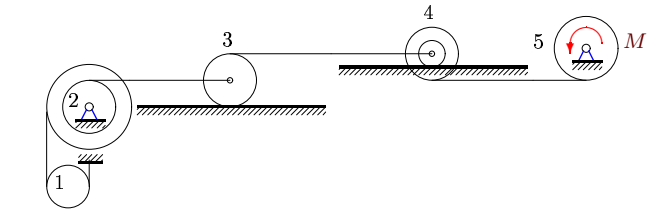
Задача L-24.4. *Воробьев Олег*



$S = [4.3, 4.5, 4.6, 4.9]$ м.

$R_1 = 2,\ r_1 = 1,\ \rho_1 = 2,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 2,\ r_3 = 1,\ \rho_3 = 1,$
$R_4 = 3,\ r_4 = 1,\ \rho_4 = 2,$
$m_1 = 4,\ m_2 = 80,$
$m_3 = 4,\ m_4 = 48,$
$m_5 = 32.$

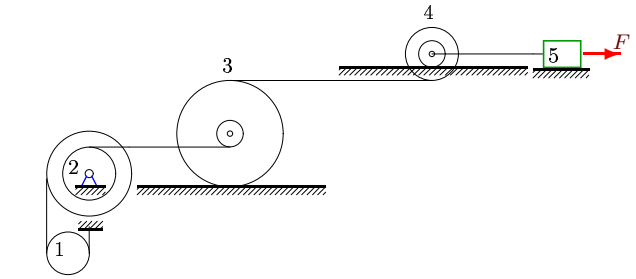
Задача L-24.5. *Гранкин Михаил*



$S = [9.2, 9.4, 9.6, 9.8]$ м.

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

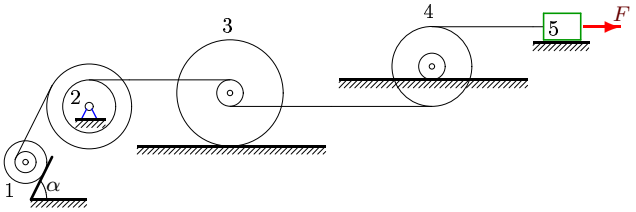
Задача L-24.6. *Дзабиев Артур*



$S = [9.3, 9.5, 9.6, 9.9]$ м.

$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 4,\ r_3 = 1,\ \rho_3 = 3,$
$R_4 = 2,\ r_4 = 1,\ \rho_4 = 1,$
$m_1 = 2,\ m_2 = 24,$
$m_3 = 36,\ m_4 = 9,$
$m_5 = 18.$

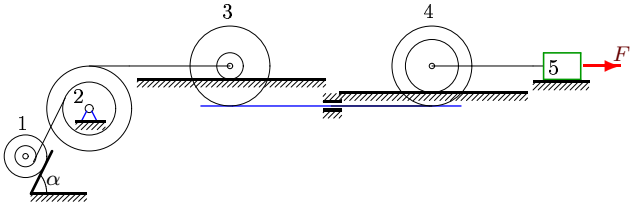
Задача L-24.7. *Ильин Иван*



$S = [8.3, 8.4, 8.7, 8.8]$ м.

$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 3,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 4,\ r_3 = 1,\ \rho_3 = 3,$
$R_4 = 3,\ r_4 = 1,\ \rho_4 = 2,$
$m_1 = 20,\ m_2 = 8,$
$m_3 = 8,\ m_4 = 140,$
$m_5 = 150.$

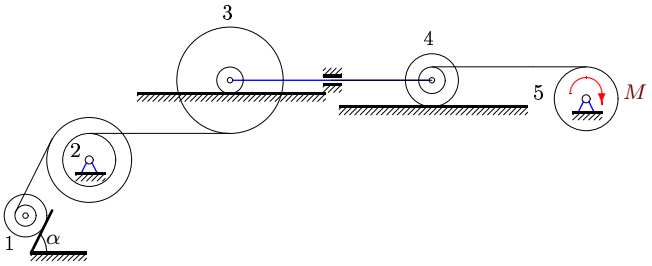
Задача L-24.8. *Касимов Саид*



$S = [9.2, 9.5, 9.7, 9.9]$ м.

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

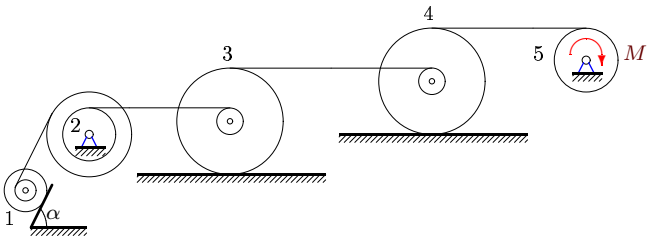
Задача L-24.9. *Ковалев Роман*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 3,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 4,\ r_3 = 1,\ \rho_3 = 3,$
$R_4 = 2,\ r_4 = 1,\ \rho_4 = 1,$
$m_1 = 4,\ m_2 = 24,$
$m_3 = 36,\ m_4 = 108,$
$m_5 = 16.$

$S = [4.2, 4.4, 4.6, 4.8]$ м.

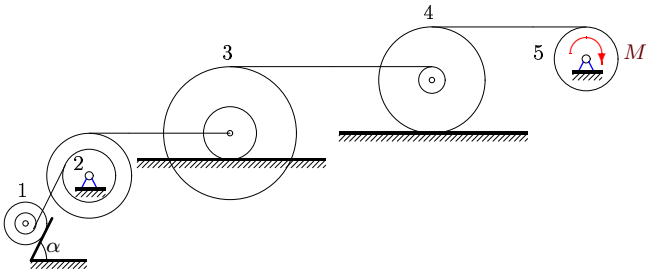
Задача L-24.10. *Матросов Сергей*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 3,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 4,\ r_3 = 1,\ \rho_3 = 3,$
$R_4 = 4,\ r_4 = 1,\ \rho_4 = 3,$
$m_1 = 4,\ m_2 = 12,$
$m_3 = 4,\ m_4 = 75,$
$m_5 = 1250.$

$S = [1.2, 1.4, 1.6, 1.9]$ м.

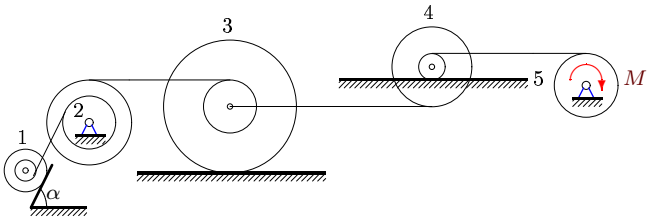
Задача L-24.11. *Тенютин Роман*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 3,$
$R_3 = 5,\ r_3 = 2,\ \rho_3 = 4,$
$R_4 = 4,\ r_4 = 1,\ \rho_4 = 3,$
$m_1 = 4,\ m_2 = 64,$
$m_3 = 4,\ m_4 = 12,$
$m_5 = 50.$

$S = [1.2, 1.4, 1.7, 1.9]$ м.

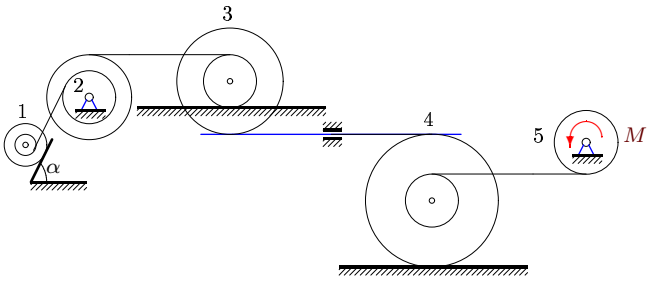
Задача L-24.12. *Фролов Михаил*



$R_1 = 2,\ r_1 = 1,\ \rho_1 = 1,$
$R_2 = 4,\ r_2 = 2,\ \rho_2 = 2,$
$R_3 = 5,\ r_3 = 2,\ \rho_3 = 4,$
$R_4 = 3,\ r_4 = 1,\ \rho_4 = 2,$
$m_1 = 4,\ m_2 = 80,$
$m_3 = 196,\ m_4 = 196,$
$m_5 = 196.$

$S = [10.3, 10.4, 10.6, 10.9]$ м.

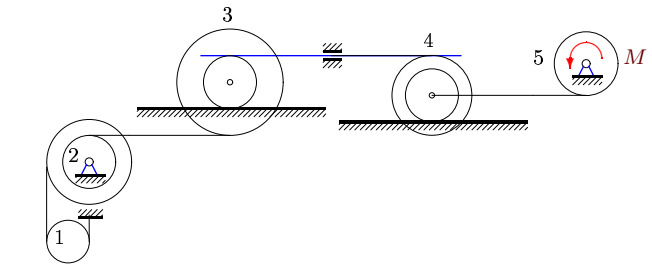
Задача L-24.13. *Черепанов Сергей*



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 3$,
$R_3 = 4$, $r_3 = 2$, $\rho_3 = 3$,
$R_4 = 5$, $r_4 = 2$, $\rho_4 = 4$,
$m_1 = 16$, $m_2 = 48$,
$m_3 = 112$, $m_4 = 400$,
$m_5 = 800$.

$S = [1.2, 1.4, 1.7, 1.8]$ м.

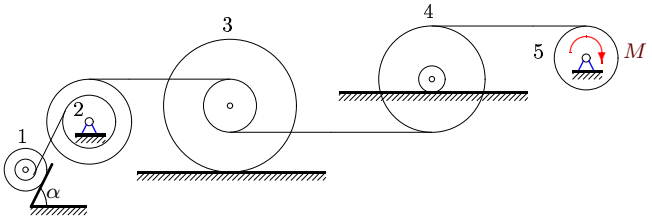
Задача L-24.14. *Шаров Иван*



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

$S = [7.2, 7.5, 7.6, 7.9]$ м.

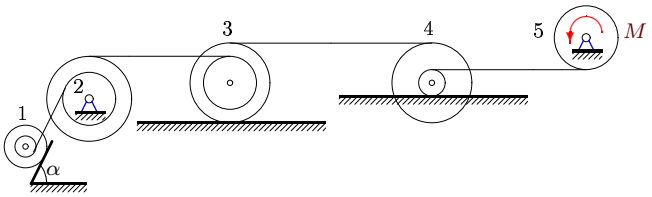
Задача L-24.15. *Коломников Ю.*



$R_1 = 2$, $r_1 = 1$, $\rho_1 = 1$,
$R_2 = 4$, $r_2 = 2$, $\rho_2 = 2$,
$R_3 = 5$, $r_3 = 2$, $\rho_3 = 4$,
$R_4 = 4$, $r_4 = 1$, $\rho_4 = 3$,
$m_1 = 8$, $m_2 = 48$,
$m_3 = 245$, $m_4 = 196$,
$m_5 = 294$.

$S = [8.2, 8.5, 8.6, 8.8]$ м.

Задача L-24.16. *Лебедев А.*



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

$S = [6.2, 6.5, 6.6, 6.9]$ м.