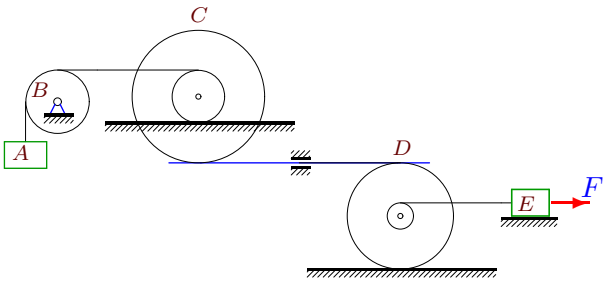
Кинетическая энергия системы. Приведенные массы

Механическая система, состоящая из пяти тел A, B, C, D и E, движется под действием внешних сил. Заданы радиусы цилиндров и блоков. Радиусы инерции 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 μ в формуле $T = \mu v_A^2/2$, где v_A — скорость груза A.

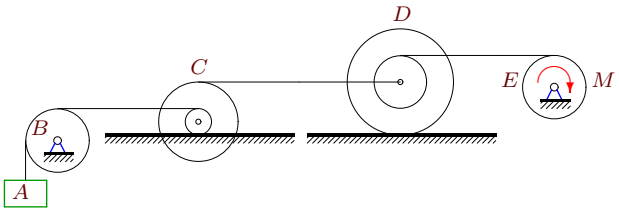
Кирсанов М.Н. **Решебник. Теоретическая механика**/Под ред. А. И. Кириллова.– М.:ФИЗМАТЛИТ, 2008.– 384 с. (с.257.)

Задача 33.1.



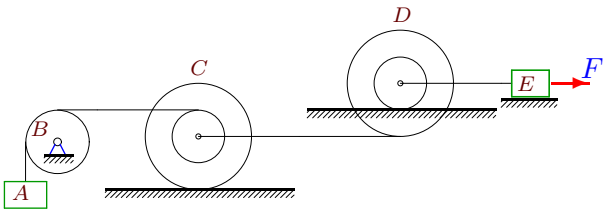
$R_C = 5$, $r_c = 2$, $i_C = 4$,
$R_D = 4$, $r_D = 1$, $i_D = 3$,
$m_A = 13$, $m_B = 8$,
$m_C = 20$, $m_D = 1024$,
$m_E = 1024$.

Задача 33.2.



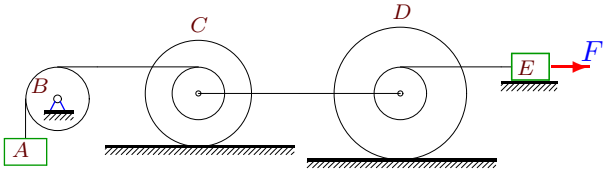
$R_C = 3$, $r_c = 1$, $i_C = 2$,
$R_D = 4$, $r_D = 2$, $i_D = 3$,
$m_A = 12$, $m_B = 4$,
$m_C = 20$, $m_D = 16$,
$m_E = 6$.

Задача 33.3.



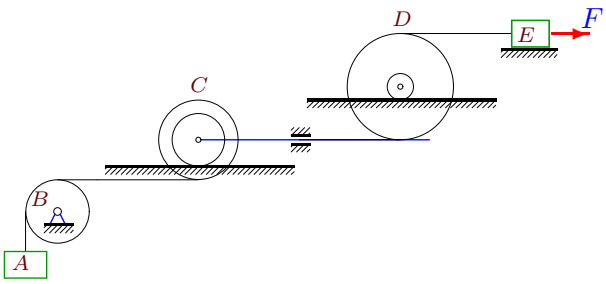
$R_C = 4$, $r_c = 2$, $i_C = 3$,
$R_D = 4$, $r_D = 2$, $i_D = 3$,
$m_A = 14$, $m_B = 10$,
$m_C = 144$, $m_D = 27$,
$m_E = 18$.

Задача 33.4.



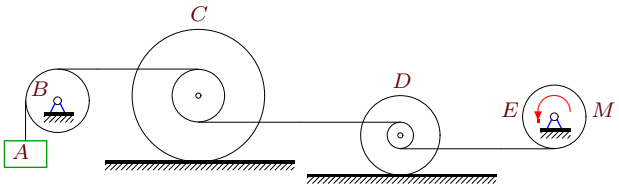
$R_C = 4$, $r_c = 2$, $i_C = 3$,
$R_D = 5$, $r_D = 2$, $i_D = 4$,
$m_A = 11$, $m_B = 8$,
$m_C = 216$, $m_D = 225$,
$m_E = 225$.

Задача 33.5.



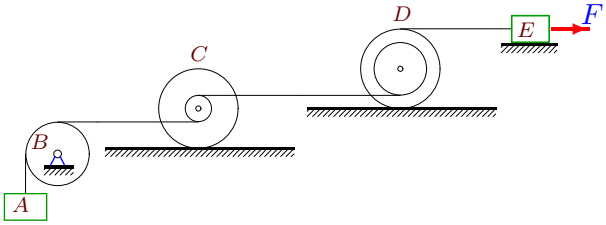
$R_C = 3,\ r_c = 2,\ i_C = 2,$
$R_D = 4,\ r_D = 1,\ i_D = 3,$
$m_A = 20,\ m_B = 8,$
$m_C = 6,\ m_D = 45,$
$m_E = 36.$

Задача 33.6.



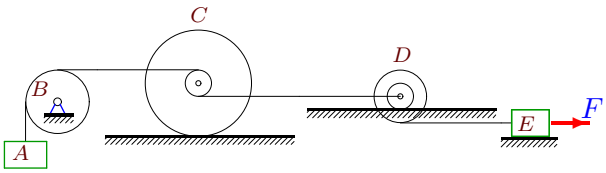
$R_C = 5,\ r_c = 2,\ i_C = 4,$
$R_D = 3,\ r_D = 1,\ i_D = 2,$
$m_A = 12,\ m_B = 10,$
$m_C = 245,\ m_D = 784,$
$m_E = 392.$

Задача 33.7.



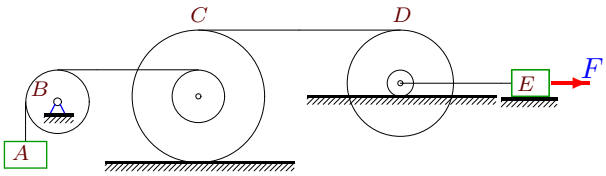
$R_C = 3,\ r_c = 1,\ i_C = 2,$
$R_D = 3,\ r_D = 2,\ i_D = 2,$
$m_A = 9,\ m_B = 12,$
$m_C = 20,\ m_D = 4,$
$m_E = 1.$

Задача 33.8.



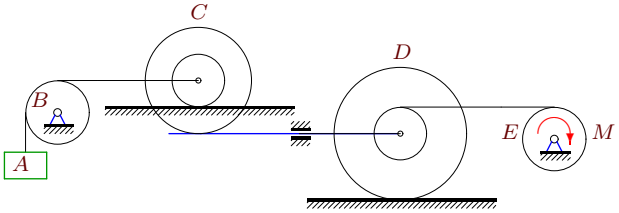
$R_C = 4,\ r_c = 1,\ i_C = 3,$
$R_D = 2,\ r_D = 1,\ i_D = 1,$
$m_A = 19,\ m_B = 12,$
$m_C = 8,\ m_D = 175,$
$m_E = 150.$

Задача 33.9.



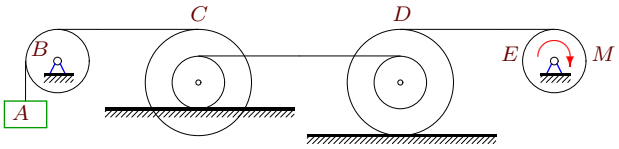
$R_C = 5,\ r_c = 2,\ i_C = 4,$
$R_D = 4,\ r_D = 1,\ i_D = 3,$
$m_A = 11,\ m_B = 8,$
$m_C = 294,\ m_D = 245,$
$m_E = 196.$

Задача 33.10.



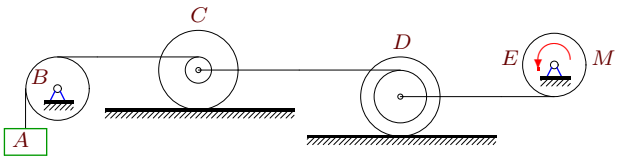
$R_C = 4,\ r_c = 2,\ i_C = 3,$
$R_D = 5,\ r_D = 2,\ i_D = 4,$
$m_A = 15,\ m_B = 8,$
$m_C = 20,\ m_D = 100,$
$m_E = 150.$

Задача 33.11.



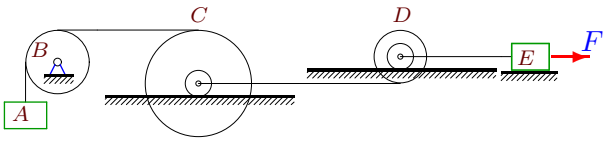
$R_C = 4,\ r_c = 2,\ i_C = 3,$
$R_D = 4,\ r_D = 2,\ i_D = 3,$
$m_A = 8,\ m_B = 10,$
$m_C = 144,\ m_D = 243,$
$m_E = 162.$

Задача 33.12.



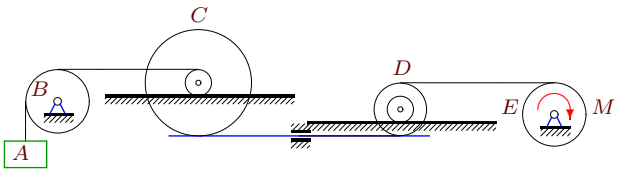
$R_C = 3,\ r_c = 1,\ i_C = 2,$
$R_D = 3,\ r_D = 2,\ i_D = 2,$
$m_A = 9,\ m_B = 2,$
$m_C = 64,\ m_D = 400,$
$m_E = 800.$

Задача 33.13.



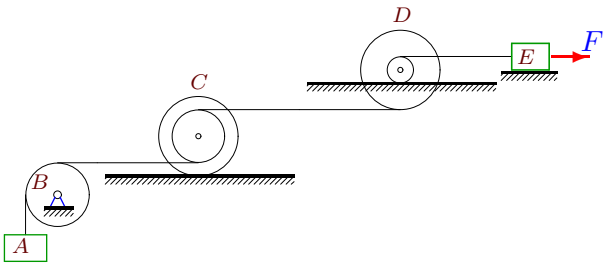
$R_C = 4,\ r_c = 1,\ i_C = 3,$
$R_D = 2,\ r_D = 1,\ i_D = 1,$
$m_A = 20,\ m_B = 12,$
$m_C = 35,\ m_D = 150,$
$m_E = 125.$

Задача 33.14.



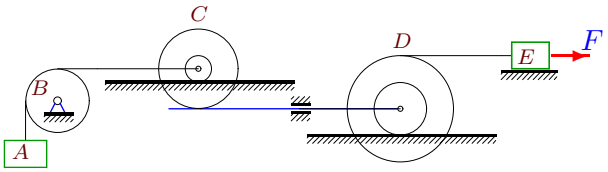
$R_C = 4,\ r_c = 1,\ i_C = 3,$
$R_D = 2,\ r_D = 1,\ i_D = 1,$
$m_A = 20,\ m_B = 12,$
$m_C = 10,\ m_D = 8,$
$m_E = 24.$

Задача 33.15.



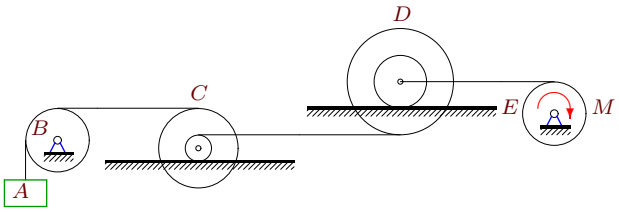
$R_C = 3,\ r_c = 2,\ i_C = 2,$
$R_D = 3,\ r_D = 1,\ i_D = 2,$
$m_A = 16,\ m_B = 4,$
$m_C = 4,\ m_D = 4,$
$m_E = 2.$

Задача 33.16.



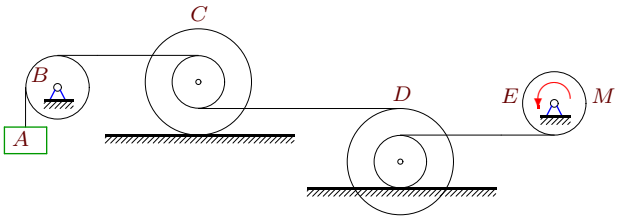
$R_C = 3,\ r_c = 1,\ i_C = 2,$
$R_D = 4,\ r_D = 2,\ i_D = 3,$
$m_A = 19,\ m_B = 10,$
$m_C = 6,\ m_D = 5,$
$m_E = 4.$

Задача 33.17.



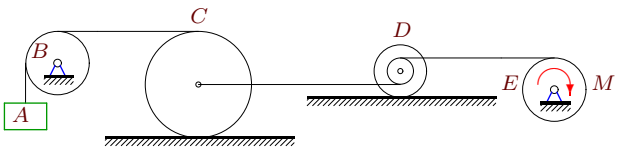
$R_C = 3,\ r_c = 1,\ i_C = 2,$
$R_D = 4,\ r_D = 2,\ i_D = 3,$
$m_A = 18,\ m_B = 10,$
$m_C = 96,\ m_D = 80,$
$m_E = 32.$

Задача 33.18.



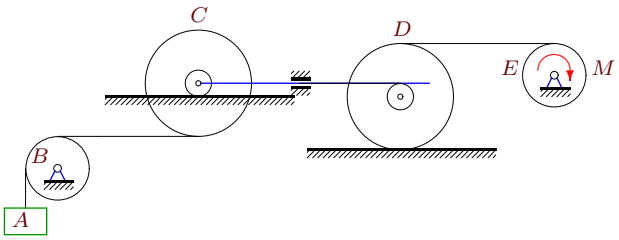
$R_C = 4,\ r_c = 2,\ i_C = 3,$
$R_D = 4,\ r_D = 2,\ i_D = 3,$
$m_A = 12,\ m_B = 10,$
$m_C = 144,\ m_D = 324,$
$m_E = 162.$

Задача 33.19.



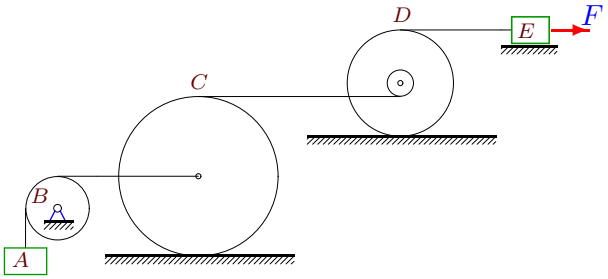
$R_C = 4,$
$R_D = 2,\ r_D = 1,\ i_D = 1,$
$m_A = 10,\ m_B = 12,$
$m_C = 40,\ m_D = 16,$
$m_E = 24.$

Задача 33.20.



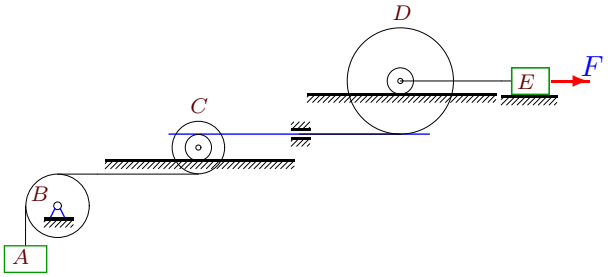
$R_C = 4,\ r_c = 1,\ i_C = 3,$
$R_D = 4,\ r_D = 1,\ i_D = 3,$
$m_A = 12,\ m_B = 6,$
$m_C = 45,\ m_D = 36,$
$m_E = 450.$

Задача 33.21.



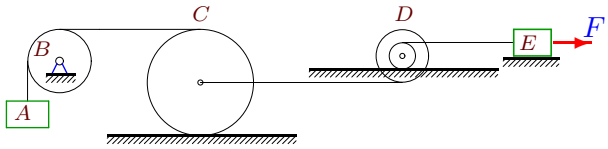
$R_C = 6,$
$R_D = 4,\ r_D = 1,\ i_D = 3,$
$m_A = 7,\ m_B = 6,$
$m_C = 10,\ m_D = 36,$
$m_E = 9.$

Задача 33.22.



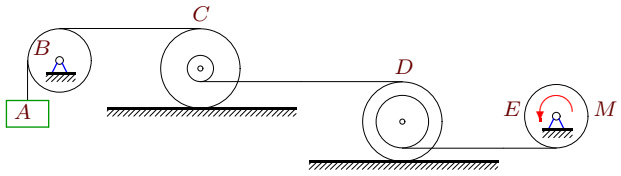
$R_C = 2,\ r_c = 1,\ i_C = 1,$
$R_D = 4,\ r_D = 1,\ i_D = 3,$
$m_A = 23,\ m_B = 8,$
$m_C = 7,\ m_D = 54,$
$m_E = 45.$

Задача 33.23.



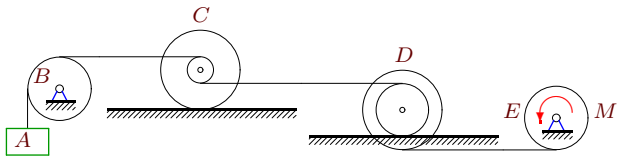
$R_C = 4,$
$R_D = 2,\ r_D = 1,\ i_D = 1,$
$m_A = 17,\ m_B = 2,$
$m_C = 56,\ m_D = 12,$
$m_E = 5.$

Задача 33.24.



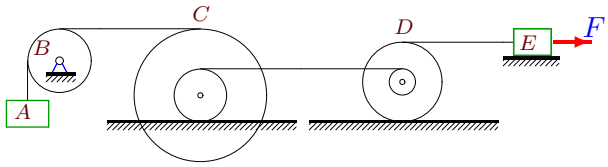
$R_C = 3,\ r_c = 1,\ i_C = 2,$
$R_D = 3,\ r_D = 2,\ i_D = 2,$
$m_A = 9,\ m_B = 2,$
$m_C = 288,\ m_D = 324,$
$m_E = 648.$

Задача 33.25.



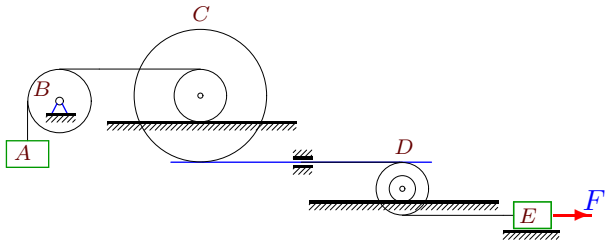
$R_C = 3,\ r_c = 1,\ i_C = 2,$
$R_D = 3,\ r_D = 2,\ i_D = 2,$
$m_A = 16,\ m_B = 12,$
$m_C = 64,\ m_D = 24,$
$m_E = 128.$

Задача 33.26.



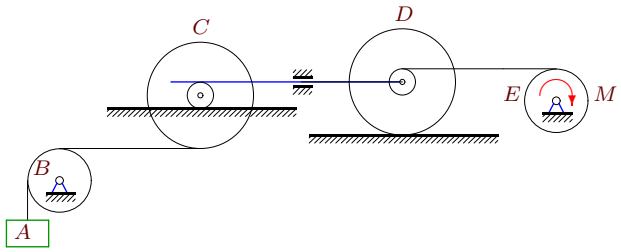
$R_C = 5,\ r_c = 2,\ i_C = 4,$
$R_D = 3,\ r_D = 1,\ i_D = 2,$
$m_A = 10,\ m_B = 4,$
$m_C = 294,\ m_D = 245,$
$m_E = 196.$

Задача 33.27.



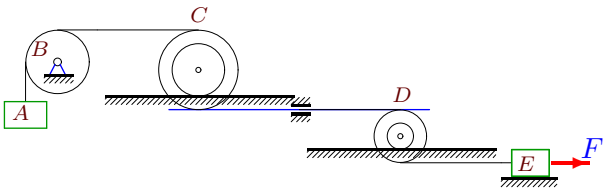
$R_C = 5,\ r_c = 2,\ i_C = 4,$
$R_D = 2,\ r_D = 1,\ i_D = 1,$
$m_A = 19,\ m_B = 12,$
$m_C = 16,\ m_D = 24,$
$m_E = 32.$

Задача 33.28.



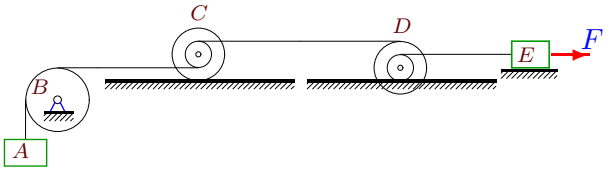
$R_C = 4,\ r_c = 1,\ i_C = 3,$
$R_D = 4,\ r_D = 1,\ i_D = 3,$
$m_A = 16,\ m_B = 6,$
$m_C = 45,\ m_D = 144,$
$m_E = 216.$

Задача 33.29.



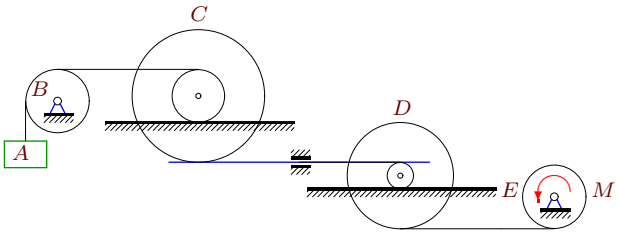
$R_C = 3,\ r_c = 2,\ i_C = 2,$
$R_D = 2,\ r_D = 1,\ i_D = 1,$
$m_A = 19,\ m_B = 2,$
$m_C = 150,\ m_D = 225,$
$m_E = 225.$

Задача 33.30.



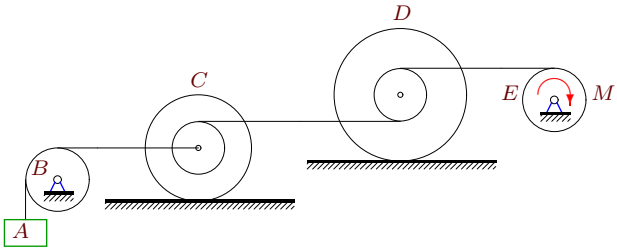
$R_C = 2,\ r_c = 1,\ i_C = 1,$
$R_D = 2,\ r_D = 1,\ i_D = 1,$
$m_A = 14,\ m_B = 12,$
$m_C = 6,\ m_D = 5,$
$m_E = 4.$

Задача 33.31.



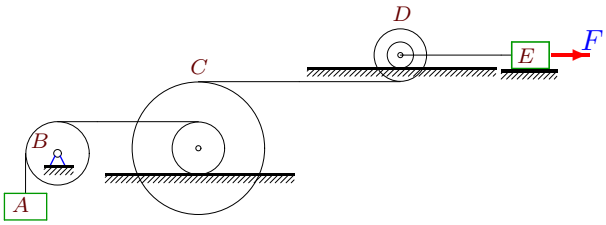
$R_C = 5,\ r_c = 2,\ i_C = 4,$
$R_D = 4,\ r_D = 1,\ i_D = 3,$
$m_A = 25,\ m_B = 8,$
$m_C = 32,\ m_D = 224,$
$m_E = 128.$

Задача 33.32.



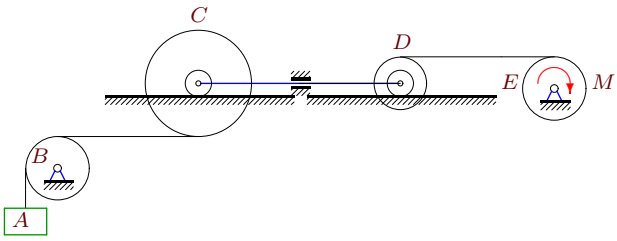
$R_C = 4,\ r_c = 2,\ i_C = 3,$
$R_D = 5,\ r_D = 2,\ i_D = 4,$
$m_A = 11,\ m_B = 6,$
$m_C = 80,\ m_D = 16,$
$m_E = 24.$

Задача 33.33.



$R_C = 5,\ r_c = 2,\ i_C = 4,$
$R_D = 2,\ r_D = 1,\ i_D = 1,$
$m_A = 19,\ m_B = 2,$
$m_C = 28,\ m_D = 48,$
$m_E = 80.$

Задача 33.34.



$R_C = 4,\ r_c = 1,\ i_C = 3,$
$R_D = 2,\ r_D = 1,\ i_D = 1,$
$m_A = 19,\ m_B = 2,$
$m_C = 54,\ m_D = 45,$
$m_E = 8.$

33.1

Кинетическая энергия системы. Приведенные массы

	μ_A	μ_B	μ_C	μ_D	μ_E	μ
1	13	4	25	225	225	492
2	12	2	25	100	27	166
3	14	5	100	39	8	166
4	11	4	150	164	196	525
5	20	4	48	200	400	672
6	12	5	205	117	9	348
7	9	6	65	208	144	432
8	19	6	8	126	54	213
9	11	4	246	200	16	477
10	15	4	65	164	147	395
11	8	5	52	75	64	204
12	9	1	52	117	81	260
13	20	6	14	12	5	57
14	20	6	25	36	243	330
15	16	2	52	125	50	245
16	19	5	30	65	144	263
17	18	5	30	65	4	122
18	12	5	100	13	4	134
19	10	6	15	20	27	78
20	12	3	50	4	64	133
21	7	3	15	400	256	681
22	23	4	14	240	20	301
23	17	1	21	6	5	50
24	9	1	104	13	1	128
25	16	6	52	3	1	78
26	10	2	120	65	144	341
27	19	6	20	3	2	50
28	16	3	50	100	75	244
29	19	1	48	2	1	71
30	14	6	30	10	16	76
31	25	4	40	315	81	465
32	11	3	125	164	147	450
33	19	1	35	294	245	594
34	19	1	60	10	4	94