

Mathematics homework #1

Homework consists of 10 exercises. Exercises are numbered and title with their topics are marked near the number. Hints are provided to make solution process easier.

Exercise statements use parameters a, b, c , etc. to make tasks distinct for different students. List of parameter values is present in table 1 in appendix B.

- **Solutions should be handwritten** with rather thorough explanations regarding notation introduced by the student (i.e. what are the events A, B etc.) and chosen ways to solve the problems. (See appendix A for example.)
- **Each solution should start** with the exercise statement with the **individual parameter values**.
- **Solutions should be labeled with student name and the individual number** (according to table 1 of the appendix B), group number and homework number.
- Pictures of submission should be sent to lecturer's email Sergey.Garbar@novsu.ru, **with subject including student's name with the individual number** (according to table 2 of the appendix B), group number and homework number. Submission will be checked; the result will be sent as a reply to the original email.
- **Solutions** to at least 70% of the exercises **should be correct**. If some of the solutions are not correct, corresponding exercises should be done again — until they are.

Exercise 1.1: Classical probability

A box contains marbles. There are a red marbles, b blue marbles, c green marbles, d yellow marbles and e white marbles. What is the probability that the randomly chosen marble is f ?

Exercise 1.2: Complement of the event

A box contains marbles. There are a red marbles, b blue marbles, c green marbles, d yellow marbles and e white marbles. What is the probability that the randomly chosen marble is not g ?

Hint: how is this a complement event? What formula should be used here?

Exercise 1.3: Compound events

A box contains marbles. There are a red marbles, b blue marbles, c green marbles, d yellow marbles and e white marbles. Two marbles are consequently taken out of box at random. What is the probability that the first marble is g and the second is f ?

Hint: what kind of the compound event is considered here? What rule for finding the probability should be used?

Exercise 1.4: Compound events

There are a red pens, b blue pens, c red pencils and d blue pencils on the desk. One of these items fell to the floor. What is the probability that it was h or i ?

Hint: what kind of the compound event is considered here? What rule for finding the probability should be used?

Exercise 1.5: Counting rules

A person has a scarfs, b hats and d jackets. How many ways to choose a scarf, a hat and a jacket does this person have?

Exercise 1.6: Counting rules

Password can contain j English letters and digits. Length of password is e symbols. How many passwords are possible?

Exercise 1.7: Counting rules

A student has c different notebooks and decided to give a of them to a friend. How many ways does he have to give away these notebooks?

Hint: is that a permutation or a combination? Why?

Exercise 1.8: Counting rules

A student has d different notebooks and a different subjects. How many ways does he have to assign a notebook to a subject?

Hint: is that a permutation or a combination? Why?

Exercise 1.9: Total probability law

There were b apples and c oranges in the first basket. There are d apples and e oranges in the second basket. One basket is chosen. Probability to choose the first basket is $1/a$. One fruit is taken out. What is the probability that this fruit is an apple?

Hint: what two steps can we split the experiment into? What are the probabilities of those steps?

Exercise 1.10: Bayes' theorem

There were b apples and c oranges in the first basket. There are d apples and e oranges in the second basket. One basket is chosen. Probability to choose the first basket is $1/a$. One fruit is taken out, and it is an apple. What is the probability that the first basket was chosen?

Hint: what is the prior probability? How does the knowledge which fruit was obtained affects this probability? How the posterior probability should be denoted?

Useful links

[Textbook](#)

[Total probability rule](#)

[Bayes' theorem](#)

Appendix A: Submission example

John Smith, group 3312, individual number 120

Substitute with **your name, group and individual number**.

Parameter values: $a = 5, b = 9, c = 14, d = 11, e = 8, f=\text{yellow}, g=\text{yellow}, h=\text{pen}, i=\text{red}, j=\text{lower or uppercase}$.

Exercise 1.1 (note individual parameter values!)

A box contains marbles. There are **5** red marbles, **9** blue marbles, **14** green marbles, **11** yellow marbles and **8** white marbles. What is the probability that the randomly chosen marble is **yellow**?

Place your solution here (with rather thorough explanations regarding notation introduced by the student and chosen ways to solve the problems).

Exercise 1.2

A box contains marbles. There are **5** red marbles, **9** blue marbles, **14** green marbles, **11** yellow marbles and **8** white marbles. What is the probability that the randomly chosen marble is not **yellow**?

Place your solution here (with rather thorough explanations regarding notation introduced by the student and chosen ways to solve the problems).

The rest of the exercises should be also presented in the same manner.

Appendix B: individual parameter values

Table 1 — Parameter values for exercises

Individual number	Student name	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>
1	Абдельрахман Торайя Халид Шабана	2	3	6	7	8	red	green	pen	blue	lowercase
2	Абду Али Гамаль Али	3	5	8	9	9	green	blue	pencil	red	uppercase
3	Али Ахмад	4	6	10	11	10	blue	white	pencil	blue	lower or uppercase
4	Аль-Радаи Абдулла Али Мохаммед Хуссейн	5	7	12	7	11	white	yellow	pencil	red	lowercase
5	Асгар Мухаммад	2	8	14	9	12	yellow	green	pen	blue	uppercase
6	Ахмад Башир	3	9	6	11	13	red	blue	pen	red	lower or uppercase
7	Ахмед Ахмед Ибрахим Абделсалам	4	3	8	7	7	green	white	pencil	blue	lowercase
8	Ахмед Надер Сайед Абдулсалам	5	5	10	9	8	blue	yellow	pencil	red	uppercase
9	Багху Сухаиль	2	6	12	11	9	white	green	pencil	blue	lower or uppercase
10	Гадамари Еганех	3	7	14	7	10	yellow	blue	pen	red	lowercase
11		4	8	6	9	11	red	white	pen	blue	uppercase
12	Еисса Мохамед Сабер Мохамед	5	9	8	11	12	green	yellow	pencil	red	lower or uppercase
13	Заре Алиреза	2	3	10	7	13	blue	green	pencil	blue	lowercase
14	Ибрахим Шериф Халед Хаммад Уда	3	5	12	9	7	white	blue	pencil	red	uppercase
15	Идрис Сухайла Ибрагим Аббас	4	6	14	11	8	yellow	white	pen	blue	lower or uppercase
16	Имран Мухаммад	5	7	6	7	9	red	yellow	pen	red	lowercase
17	Лотфи Мохаммад	2	8	8	9	10	green	green	pencil	blue	uppercase
18	Махмуд Ахмед Мухамед Ахмед	3	9	10	11	11	blue	blue	pencil	red	lower or uppercase
19	Махмуд Сондос Ахмед Мохамед	4	3	12	7	12	white	white	pencil	blue	lowercase
20	Мохамед Мустафа Анас Эльсайед Эльсайед	5	5	14	9	13	yellow	yellow	pen	red	uppercase
21	Мохамед Хаснаа Мохамед Мохамед Абдалла	2	6	6	11	7	red	green	pen	blue	lower or uppercase
22	Мунир Шоаиб	3	7	8	7	8	green	blue	pencil	red	lowercase
23	Мурси Ахмед Захер Саиид Ахмед	4	8	10	9	9	blue	white	pencil	blue	uppercase
24	Райд Мохамед Рагаб Ради	5	9	12	11	10	white	yellow	pencil	red	lower or uppercase
25	Рашиди Мохаммад	2	3	14	7	11	yellow	green	pen	blue	lowercase
26	Фатхалла Заяд Мохамед Абделаизиз Котб	3	5	6	9	12	red	blue	pen	red	uppercase
27	Хажжи Сабрина	4	6	8	11	13	green	white	pencil	blue	lower or uppercase
28	Хан Гулаб	5	7	10	7	7	blue	yellow	pencil	red	lowercase
29	Хан Шах Заман	2	8	12	9	8	white	green	pencil	blue	uppercase
30	Шахин Амру Мохамед Абдельазиз Морси	3	9	14	11	9	yellow	blue	pen	red	lower or uppercase
31	Эссаяд Мохамед Фирас	4	3	6	7	10	red	white	pen	blue	lowercase
32		5	5	8	9	11	green	yellow	pencil	red	uppercase
33		2	6	10	11	12	blue	green	pencil	blue	lower or uppercase
34	Алхафидих Муктада Имран Али	3	7	12	7	13	white	blue	pencil	red	lowercase
35	Аль Хади Раван Аль Хади Махмуд Мохаммед	4	8	14	9	7	yellow	white	pen	blue	uppercase
36	Аммар Ахмед Махмуд Омар Амин	5	9	6	11	8	red	yellow	pen	red	lower or uppercase
37	Богдади Сара Елсайд Али Абуелсаад	2	3	8	7	9	green	green	pencil	blue	lowercase
38	Елсайед Кхалед Махмуд Абдалла Абделвахед	3	5	10	9	10	blue	blue	pencil	red	uppercase
39	Елсаяд Амира Абделфаттах Мохамед Али	4	6	12	11	11	white	white	pencil	blue	lower or uppercase
40	Корани Махмуд Ахмед Мохамед	5	7	14	7	12	yellow	yellow	pen	red	lowercase

Individual number	Student name	a	b	c	d	e	f	g	h	i	j
41	Мегареб Маяда Адель Абделати	2	8	6	9	13	red	green	pen	blue	uppercase
42	Мера Момен Ашраф Самир Абделфаттах	3	9	8	11	7	green	blue	pencil	red	lower or uppercase
43	Мира Мохамед Ашраф Самир Абделфатих	4	3	10	7	8	blue	white	pencil	blue	lowercase
44	Мохамед Мохамед Вагих Мустафа Али	5	5	12	9	9	white	yellow	pencil	red	uppercase
45	Мохамед Рокаиа Кхалед Гуда Исмаил	2	6	14	11	10	yellow	green	pen	blue	lower or uppercase
46	Наср Ебрам Самир Азиз	3	7	6	7	11	red	blue	pen	red	lowercase
47	Сайед Ахмед Абделрахман Яхиа Абделрахман Мохамед	4	8	8	9	12	green	white	pencil	blue	uppercase
48	Сайед Ахмед Дониа Халед Шаабан Рамадан	5	9	10	11	13	blue	yellow	pencil	red	lower or uppercase
49	Собих Ахмед Хамада Мохаммед Санад	2	3	12	7	7	white	green	pencil	blue	lowercase
50	Фаргали Маи Мохсен Шехата Шолками	3	5	14	9	8	yellow	blue	pen	red	uppercase
51	Халифа Салах Махер Абдалла	4	6	6	11	9	red	white	pen	blue	lower or uppercase
52	Хасан Мохамед Абдельрауф Абдельсалам	5	7	8	7	10	green	yellow	pencil	red	lowercase
53	Шитиви Элсаид Тамер Элсаид Мохамед Абдалла	2	8	10	9	11	blue	green	pencil	blue	uppercase
54	Элшериф Мохамед Ахмед Абоулфоту Ахмед	3	9	12	11	12	white	blue	pencil	red	lower or uppercase
55	Эльсайед Наира Мохамед Шехата Метвалли	4	3	14	7	13	yellow	white	pen	blue	lowercase
56	Юссеф Халид Валид Елсаед Елдесуки	5	5	6	9	7	red	yellow	pen	red	uppercase
57		2	6	8	11	8	green	green	pencil	blue	lower or uppercase
58	Абдалла Ахмед Шаабан Махмуд	3	7	10	7	9	blue	blue	pencil	red	lowercase
59	Абделаал Сеифелдин Мохамед Фарук Мохамед	4	8	12	9	10	white	white	pencil	blue	uppercase
60	Абделаазиз Талал Хамди Абделсамйе	5	9	14	11	11	yellow	yellow	pen	red	lower or uppercase
61	Абделдайм Махмуд Гхариб Авадалла	2	3	6	7	12	red	green	pen	blue	lowercase
62	Абделмагид Элшазли Карам Элшазли Хуссеин	3	5	8	9	13	green	blue	pencil	red	uppercase
63	Абделнаеин Ахмед Тарек Абдельмалек	4	6	10	11	7	blue	white	pencil	blue	lower or uppercase
64	Абдельазиз Ахмед Мохамед Ахмед	5	7	12	7	8	white	yellow	pencil	red	lowercase
65	Алсаид Хишам Амр Эбрахим	2	8	14	9	9	yellow	green	pen	blue	uppercase
66	Ахмед Ахмед Мохамед Борхам	3	9	6	11	10	red	blue	pen	red	lower or uppercase
67	Ахмед Мохамед Адел Салем Хассан	4	3	8	7	11	green	white	pencil	blue	lowercase
68	Ахмед Норхан Фаузи Махмуд	5	5	10	9	12	blue	yellow	pencil	red	uppercase
69	Бакри Эльзахраа Мохаммед Али	2	6	12	11	13	white	green	pencil	blue	lower or uppercase
70	Елрвини Махмуд Мохамед Елхаретх Ибрахим	3	7	14	7	7	yellow	blue	pen	red	lowercase
71	Ибрахим Ислам Мохамед Саид Мохамед	4	8	6	9	8	red	white	pen	blue	uppercase
72	Махмуд Маха Ахмед Саад	5	9	8	11	9	green	yellow	pencil	red	lower or uppercase
73	Мохамед Ахмед Мостафа Камел	2	3	10	7	10	blue	green	pencil	blue	lowercase
74	Мохамед Дина Мохамед Абделрахман Мохамед	3	5	12	9	11	white	blue	pencil	red	uppercase
75	Мохамед Ислам Мохамед Нагиб Ибрагим	4	6	14	11	12	yellow	white	pen	blue	lower or uppercase

Individual number	Student name	a	b	c	d	e	f	g	h	i	j
76	Мохамад Мохамад Фатхи Хамис Абделтаваб	5	7	6	7	13	red	yellow	pen	red	lowercase
77	Солиман Абдельазиз Сафи Абдельазиз Мохамад	2	8	8	9	7	green	green	pencil	blue	uppercase
78	Сонбол Хелми Камал Хелми Мохамад	3	9	10	11	8	blue	blue	pencil	red	lower or uppercase
79	Хабоу Мохамад Исмаил Ибрахим Хассан	4	3	12	7	9	white	white	pencil	blue	lowercase
80	Хамуда Мохамад Халед Махмуд	5	5	14	9	10	yellow	yellow	pen	red	uppercase
81	Эвейс Рамадан Корди Рамадан	2	6	6	11	11	red	green	pen	blue	lower or uppercase
82	Элесахи Хабиба Фуад Шауки Йехйа Абделаиз	3	7	8	7	12	green	blue	pencil	red	lowercase
83	Эльсайед Ахмед Усама Сайед Мохамад	4	8	10	9	13	blue	white	pencil	blue	uppercase
84		5	9	12	11	7	white	yellow	pencil	red	lower or uppercase
85	Гаурав	2	3	14	7	8	yellow	green	pen	blue	lowercase
86	Ташу	3	5	6	9	9	red	blue	pen	red	uppercase
87	Абувардех Мохамад Хатем Давуд	4	6	8	11	10	green	white	pencil	blue	lower or uppercase
88	Абутаима Анас Абдаллах Сулеиман	5	7	10	7	11	blue	yellow	pencil	red	lowercase
89	Алшабар Муна Хайдер Абдуллах	2	8	12	9	12	white	green	pencil	blue	uppercase
90	Ганизадехесбуй Мохаммад Рамезан	3	9	14	11	13	yellow	blue	pen	red	lower or uppercase
91	Джалил Сара Рифат	4	3	6	7	7	red	white	pen	blue	lowercase
92	Джалил Фатима Рифат	5	5	8	9	8	green	yellow	pencil	red	uppercase
93	Дургапал Девшри Рани	2	6	10	11	9	blue	green	pencil	blue	lower or uppercase
94	Кавя Шиваппа Субедар	3	7	12	7	10	white	blue	pencil	red	lowercase
95	Каушик Вишал	4	8	14	9	11	yellow	white	pen	blue	uppercase
96	Кристиан Самюэль Клементбхай	5	9	6	11	12	red	yellow	pen	red	lower or uppercase
97	Малле Мохантх Кумар	2	3	8	7	13	green	green	pencil	blue	lowercase
98	Манаа Мохамад Салах Ахмед	3	5	10	9	7	blue	blue	pencil	red	uppercase
99	Мохамад Хассан Реда Хассан	4	6	12	11	8	white	white	pencil	blue	lower or uppercase
100	Салимиборуджени Мохаммадреза Ахмадреза	5	7	14	7	9	yellow	yellow	pen	red	lowercase
101	Салман Абделаиз Мохамад Абделаиз	2	8	6	9	10	red	green	pen	blue	uppercase
102	Тенамучиккал Мухаммед Шаккир	3	9	8	11	11	green	blue	pencil	red	lower or uppercase
103	Хаджаз Мохамад Амин	4	3	10	7	12	blue	white	pencil	blue	lowercase
104	Хуссейн Али Карим Хуссейн	5	5	12	9	13	white	yellow	pencil	red	uppercase
105	Шерифи Шемседдин	2	6	14	11	7	yellow	green	pen	blue	lower or uppercase
106	Шривастава Аман	3	7	6	7	8	red	blue	pen	red	lowercase
107	Элтаббах Ахмед Карим Ахмед Абдельмагид	4	8	8	9	9	green	white	pencil	blue	uppercase
108	Элтахави Мохамад Сабер Рамадан	5	9	10	11	10	blue	yellow	pencil	red	lower or uppercase
109		2	3	12	7	11	white	green	pencil	blue	lowercase
110	Гул Мухаммад Билал	3	5	14	9	12	yellow	blue	pen	red	uppercase
111	Абдельрахман Ахмед Али Эльсайед Абдельмагид	4	6	6	11	13	red	white	pen	blue	lower or uppercase
112		5	7	8	7	7	green	yellow	pencil	red	lowercase
113		2	8	10	9	8	blue	green	pencil	blue	uppercase
114		3	9	12	11	9	white	blue	pencil	red	lower or uppercase
115		4	3	14	7	10	yellow	white	pen	blue	lowercase
116		5	5	6	9	11	red	yellow	pen	red	uppercase

Individual number	Student name	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>
117		2	6	8	11	12	green	green	pencil	blue	lower or uppercase
118		3	7	10	7	13	blue	blue	pencil	red	lowercase
119		4	8	12	9	7	white	white	pencil	blue	uppercase
120		5	9	14	11	8	yellow	yellow	pen	red	lower or uppercase