Contents:

Topic 1. Perfection and algorithmization of medical problems 2
Lesson №1 2
Tasks to study the topic 3
Topic 2. Formal logic in solving problems of diagnosis. treatment and prevention of disease. Coding and Classification 7
Lesson №2 7
Tasks to study the topic 8
Topic 3. Methods of decision support. Strategies to obtain medical 11
knowledge 11
Lesson №3 11
Tasks to study the topic 11
Lesson №4 14
Tasks to study the topic 14
Topic 4. Visualization of medical and biological data. 18
Lesson №6 18
Tasks to study the topic 18
Topic 7. Computer data: processing and management. 19
Lesson №10 20
Tasks to study the topic 20
Topic 8. Methods of biostatistics 22
Lesson №12 22
Tasks to study the topic 22
Topic 9. Evidence-based medicine 27
Lesson №14 27
Tasks to study the topic 27
Topic 10. Individual medical cards. Structuring the content of electronic medical cards 33
Lesson №16 33
Tasks to study the topic 33
Topic 11. Types of information systems in healthcare industry. Hospital information systems and their development 34
Lesson №18 34
Tasks to study the topic 34

Topic 1. Perfection and algorithmization of medical problems

Lesson №1

Marking	Function
	Starting and ending of program.
	Execution of one or several operations. processing of data of any kind.
	Logical block for verification data.
	Data entry.
	Cycle.

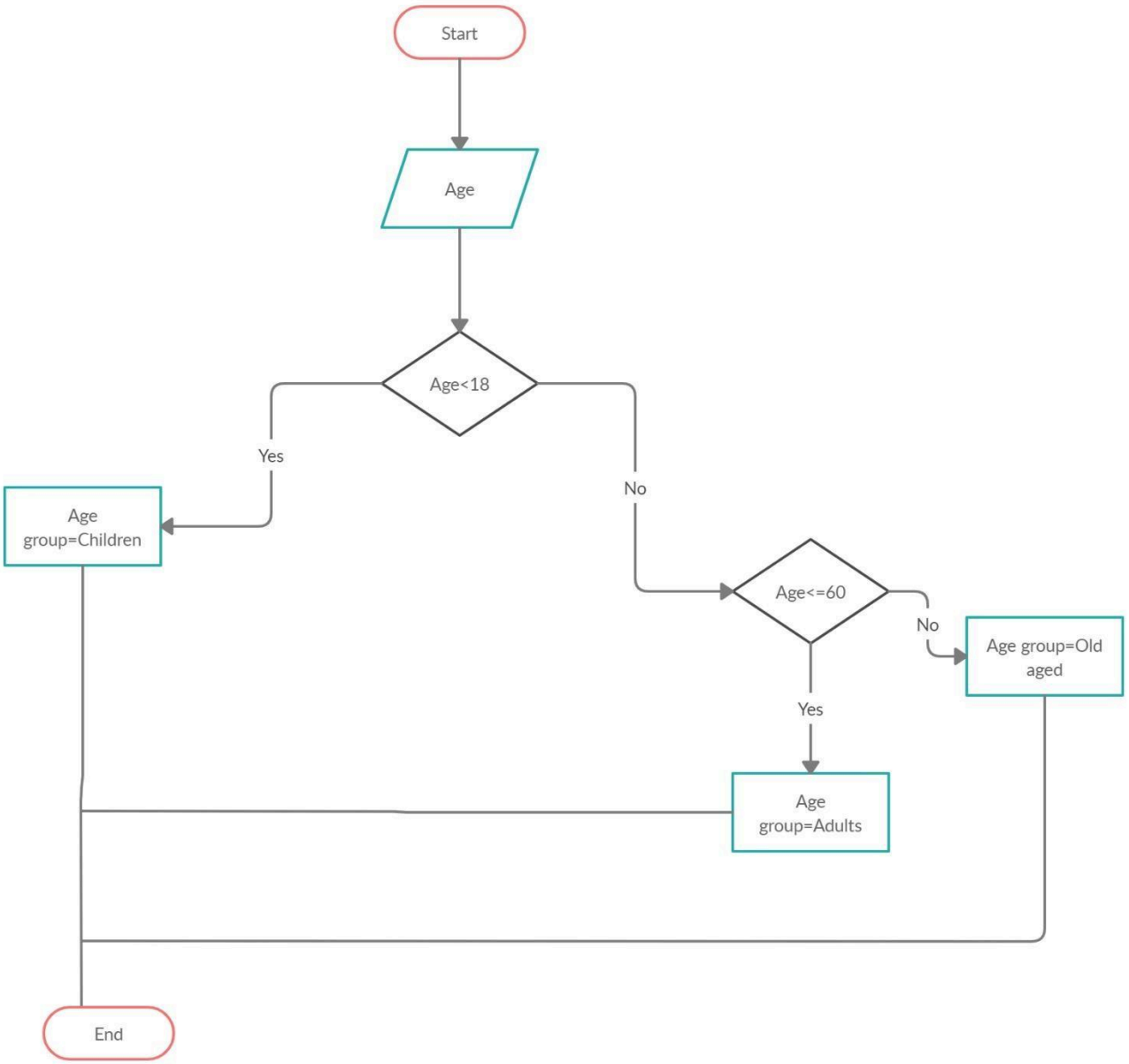
Tasks to study the topic

Task 1.

Make a flowchart for determining the age group according to the presented verbal description.

If Age <18. then Age group is “Children”
If 18<= Age<=60. then Age group is “Adults”
If Age>60. then Age group is “Old-aged”

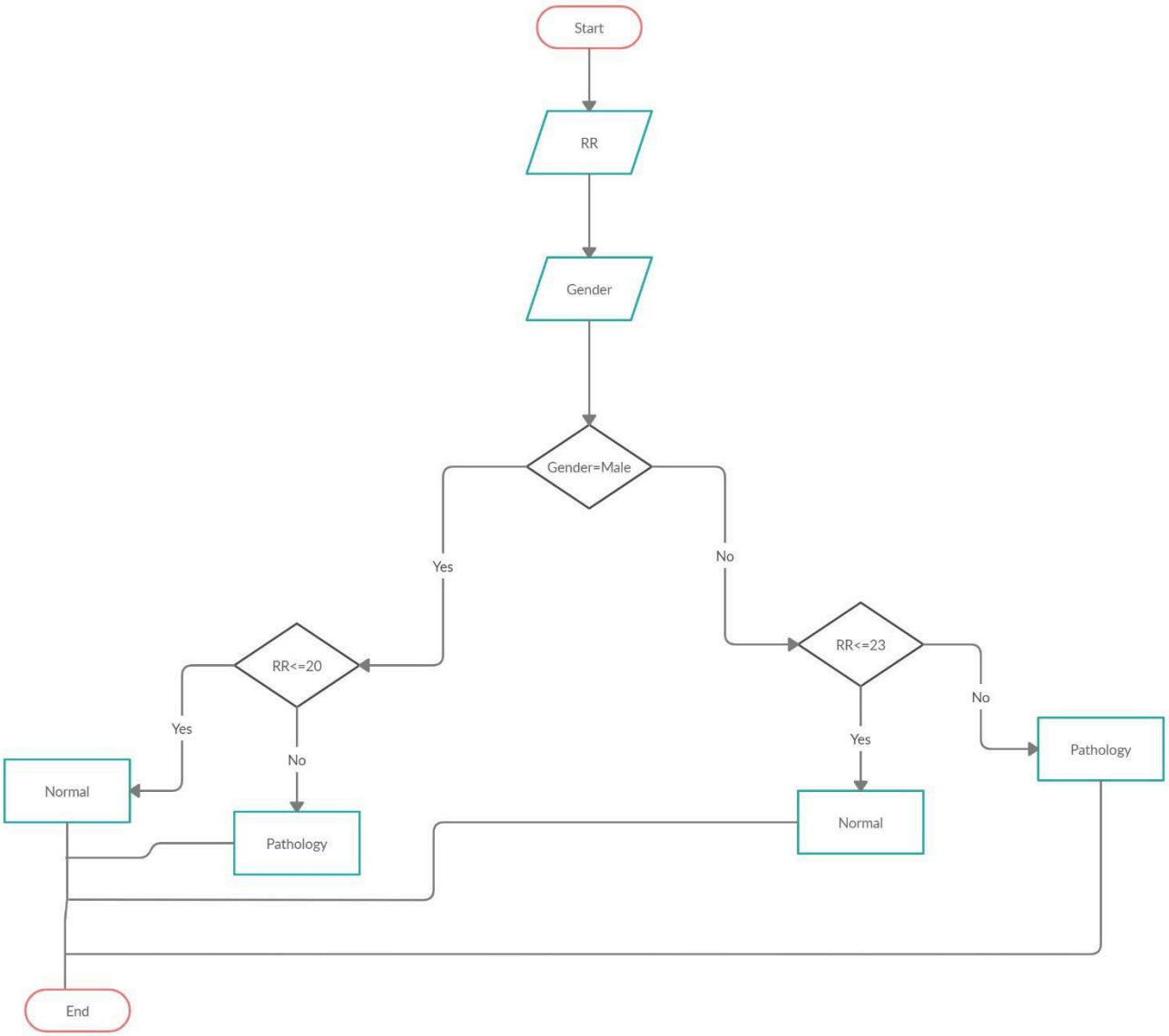
Solution



Task 2.

Make a flowchart to determine the presence of the frequency of respiration in the patient. if it is known that for men the normal respiratory rate is not greater than 20. and for women is not greater than 23.

Solution



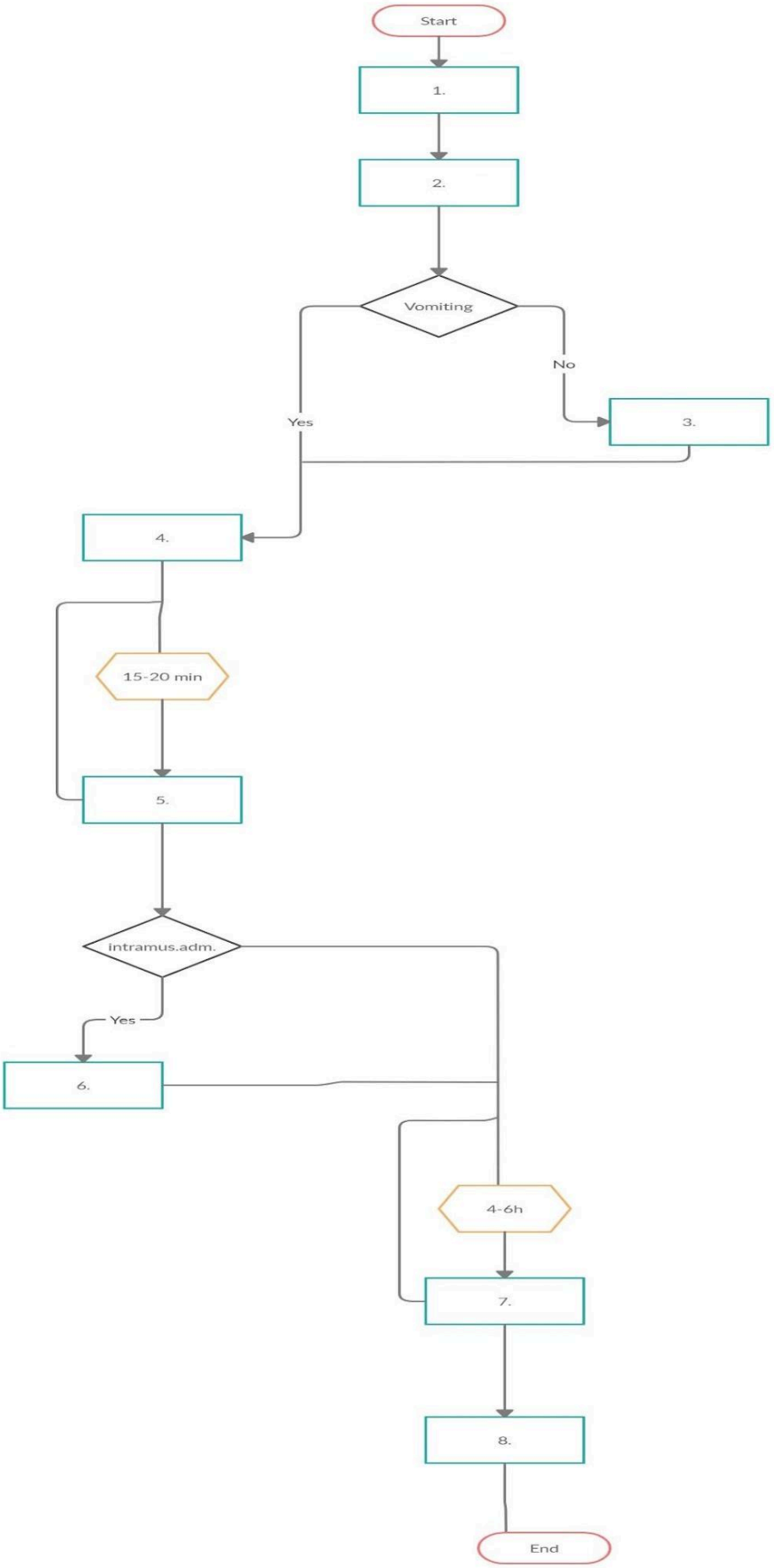
Task 3.

Make a flowchart of assistance in accordance with the presented verbal description.

Anaphylactic shock in a child. Emergency care (pre-hospital phase)

1. Immediately stop the further receipt of allergen in the body!
2. Put the child on the side to avoid asphyxiation as a result of aspiration of emesis. tongue depression.
3. In the absence of vomiting. place the patient on the back and raise patient's legs.
4. Provide access to fresh air. airway passage. Warm up the patient. apply heaters.
5. Subcutaneously administer 0.1% solution of adrenaline 0.05-0.1 ml / year of life. but not more than 1 ml. Administration of the drug repeat after 15-20 minutes.
6. When intramuscular administration of the allergen or bite it is necessary to apply the tourniquet proximally to the place of introduction (if it's possible!) For 25-30 minutes. and the injection site is surrounded with 0.1% solution of adrenaline (0.3-0.5 ml). diluted in 3-5 ml of 0.9% solution of NaCl.
7. Hormones are not a means for withdrawal from shock. but. given all their mechanisms of action. it is expedient to in / out or intake of prednisolone (0.1-0.2 ml/kg) or hydrocortisone (4-8 mg/kg) every 4-6 hours.
8. Immediately hospitalize the child.

Solution


Start
1.
2.
Vomiting
No
Yes
3.
4.
15-20 min
5.
intramus.adm.
Yes
6.
4-6h
7.
8.
End

Topic 2. Formal logic in solving problems of diagnosis. treatment and prevention of disease. Coding and Classification

Lesson №2

Logical conjunction

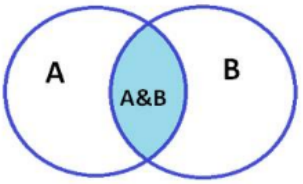
Analog of the “and”

Conjunction is the truth-functional operator of logical conjunction; the and of a set of operands is true if and only if all of its operands are true. A∧B is true if and only if A is true and B is true

Truth table

A	B	A ∧ B
0	0	0
0	1	0
1	0	0
1	1	1

Graph



Denote

$x \wedge y \qquad x \,\&\, y \qquad x \cdot y$

Disjunction

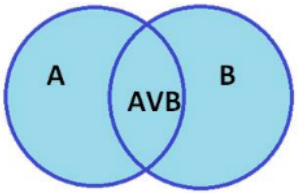
Analog of the "or".

A logical operation in which a statement made up of two or more statements is true if at least one of those statements is true.

Truth table

A	B	A V B
0	0	0
0	1	1
1	0	1
1	1	1

Graph



Denote

$x \vee y \qquad x + y \qquad x \mid y$

Negation

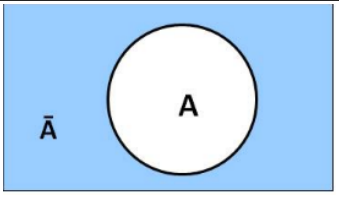
Analog of the “not”

Negation of A is false when A is true. and vice versa

Truth table

A	$\overline{A}$
0	1
1	0

Graph



Denote

$\overline{x} \qquad \neg x$

Tasks to study the topic

Task 1.

Build a truth table for a function $f = \bar{x} \vee y$.

Solution

x	y	$\bar{x}$	$f = \bar{x} \vee y$
0	0	1	1
0	1	1	1
1	0	0	0
1	1	0	1

Task 2.

Build a truth table for a function $f = \overline{x \wedge y}$.

Solution

x	y	$x \wedge y$	$f = \overline{x \wedge y}$
0	0	0	1
0	1	0	1
1	0	0	1
1	1	1	0

Task 3.

Prove $\overline{x \vee y} = \bar{x} \wedge \bar{y}$

Solution

x	y	$x \vee y$	$\overline{x \vee y}$	$\bar{x}$	$\bar{y}$	$\bar{x} \wedge \bar{y}$
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	0

Task 4.

Using logical operations. write a shortened utterance record:

"Vesicular rash is characterized by vesicles that can be manifestations of infection (chicken pox or herpes zoster) or an autoimmune disease or reactions to external influences."

Solution

A=”chicken pox”

B=”herpes zoster”

C=”an autoimmune disease”

D=”reactions to external influences”

Vesicular rash if

$(A \vee B) \vee C \vee D = 1$

Task 5.

Using logical operations. write a shortened utterance record:

"With an open pelvis fracture. there are injuries to the external body tissues . severe pain in the pelvic area. the inability to stand or sit independently."

Solution

A=”injuries to the external body tissues”

B=”severe pain in the pelvic area”

C=”the ability to stand independently”

D=”the ability to sit independently”

An open pelvis fracture if

$A \wedge B \wedge (\bar{C} \vee \bar{D}) = 1$

Task 6.

Make a table for differential diagnosis of acute colds and flu. using the following information.

Let:

a = "fever"

b = “headache”

c = "general ailment"

d = "fatigue. weakness for several weeks"

e = "extreme exhaustion"

f = "laid nose"

g = "sneeze"

h = “pharyngitis”

Then we set the diagnosis of "flu" if $a \wedge b \wedge c \wedge d \wedge e \wedge \overline{f} \wedge \overline{g} \wedge \overline{h} = 1$

and we diagnose a "cold" if $\overline{a} \wedge \overline{b} \wedge \overline{c} \wedge \overline{d} \wedge \overline{e} \wedge f \wedge g \wedge h = 1$

Solution

	flu	**cold**
fever	yes	no
headache	yes	no
general ailment	yes	no
fatigue. weakness for several weeks	yes	no
extreme exhaustion	yes	no
laid nose	no	yes
sneeze	no	yes
pharyngitis	no	yes

Topic 3. Methods of decision support. Strategies to obtain medical knowledge

Lesson №3

Tasks to study the topic

Task 1.

Fill the table:

x	$2x^2 + 3x - 5$	$\frac{x-3}{x+3}$	$\ln(x+2)$	e^{x^2+1}	$\sin 2x - 2\cos x \sin x$
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
	Sum	**Min**	**Max**	**Average**	**Count**

Task 2.

Fill the table

№	Medicines	Wholesale price	Retail price	Mark-up. %	Quantity in stock	Wholesale sum	Retail sum
1	indomethacin	79,00	83,00		46		
2	calcium gluconate	13,00	14,00		44		
3	calcium chloride	114,50	119,50		15		
4	captopril + hypothiazide	213,50	223,00		35		
5	urea	154,00	161,00		788		
6	ketorolac trometamine	462,00	483,00		120		
7	ascorbic acid	20,00	20,50		115		
8	acetylsalicylic acid	12,00	12,50		158		
9	acid mefenamina	149,50	156,50		25		
10	acid nicotine	46,00	48,50		158		

11	clonidine	39,50	41,50		34		
12	nickelamide	238,00	249,00		154		

Mark-up=(Retail price-Wholesale price)/ Wholesale price
*Wholesale sum= Wholesale price *Quantity in stock*
*Retail sum= Retail price *Quantity in stock*

Task 3.

Fill the table for Acute Heart Failure Prediction.

Post Test Probability of CHF calculate by the following formula:

$$\frac{100}{1+e^{(8+0.011\cdot Age-0.059\cdot \mathrm{PCHF}-2.3\cdot ln(NTproB)+0.0082\cdot PCHF\cdot ln(NTproB))}}$$

Age	Pre Test Prob CHF (PCHF)	NT proBNP	Post Test Prob CHF
45	40%	125	
50	35%	150	
55	50%	350	
70	30%	550	
60	60%	750	
65	45%	480	
75	55%	990	
80	65%	1500	
67	30%	850	

Task 4.

Fill the table

$$LRS = 6 + 1.03\cdot Encephalopathy - \frac{2.5\cdot Hb}{Normal\ Hb} - 1.56\cdot Albumin$$

$$Mortality = \frac{e^{LRS}}{1+e^{LRS}}\cdot 100\%$$

Gender	Hb	Albumin	Stage of encephalopathy	Normal Hb 14 for female. 15 for male	LRS	Mortality
m	14	5,5	1			
m	15	4,3	1			
f	12	3,5	2			
f	13	4,3	3			
f	12	5,6	1			
m	14	2,3	2			
f	12	4,3	1			
f	13	3,5	2			
f	12	4,3	3			

m	14	5,6	1			
m	14	2,3	2			
m	15	4,3	1			
f	12	5,6	2			
m	13	2,3	3			
m	12	4,3	1			
f	15	2,8	2			

Task 5.

1. Fill the table:

preparation	tablet weight (mg)	the content of the main chemically pure medicinal substance of this type of drugs	% content of chemically pure medicinal substance	duration of treatment (days)	dose (qty of tablets per day)	the amount of chemically pure medicinal substance that has got into the body during the treatment (for each drug in particular)	if the amount of chemically pure drug <2000 body is normal. otherwise the liver damage
1	25	20		7	4		
2	50	45		21	3		
3	100	78		10	3		
4	25	18		10	3		
5	25	16		10	2		
6	500	350		7	1		
7	100	87		5	3		
8	50	47		14	2		
9	100	64		21	2		
10	100	59		21	2		
	Average		Max % content		minimum dose		

2. Find the average weight of the tablet. the maximum percentage of chemically pure medicinal substance. the minimum dose.

Lesson №4

Tasks to study the topic

Task 1.

Calculate x^a:

x	a		
	2	3	4
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			

Task 2.

Fill the table by the products $x \cdot y$

x	y									
	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Task 3.

The baby was weighed monthly for the first year of life. Find monthly weight increment and the weight increment from the birth.

Month	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Weight, kg	3,5	4,5	5,3	5,9	6,4	6,8	7,4	7,9	8,3	8,8	9,5	10,1	10,5
Monthly increment													
Increment from the birth													

Task 4.

Apply filter to select from the file Base patients from Therapeutic department older than 18.

Copy to the new worksheet columns Age. Gender. Systolic BP. Diastolic BP.

1. In the new column "Diagnosis"
    a. for patients with SBP> 140 type "hypertension."
    b. for patients with SBP<100 type "hypotonia."
    c. write "norm" for the rest of the patients.
2. Using conditional formatting. highlight SBP>140 and SBP≤100.
3. In the new column «Treatment» for the patients older than 59. who have SBP>140 write “free of charge”.
4. Find the quantity of patients older than 59.
5. Find the quantity of female patients older than 59.
6. Find average SBP of patients older than 59.
7. Find average SBP of patients suffered on hypertension.

Task 5

Apply filter to select from the file Base female patients older than 60. Copy to the new worksheet columns Weight and Height

1. Find BMI=Weight (kg)/Height $(m)^2$
3. Choose the group according to the table

BMI	Group
BMI <18,5	Underweight
18,5<= BMI <25	Normal
25<= BMI <30	Overweight
30<= BMI <40	Moderately Obese
BMI>=40	Severely Obese

4. Find the quantity of patients in each group.
5. Find the percent of patients in each group.
6. Highlight

    BMI less then normal by red

    Normal BMI by yellow

    BMI grater then normal by green

Task 6

For the following group of students:

№	Gender	Practical classes score	Module score	Total score
1	m	120	70	
2	f	70	60	
3	m	75	50	
4	m	80	60	
5	f	90	65	
6	f	95	70	
7	m	115	75	
8	m	110	40	
9	f	105	60	
10	m	65	55	
11	m	75	50	
12	f	80	100	

1. Find the total score for each student.

2. Convert total score into the 5-marks scale according to the table

5	180-200
4	150-179
3	120-149
2	0-119

3. For students with Module score less then 50 write «Reworking»
4. Find the average total score for male students
5. Create the formula to determine which gender has the greatest average total score

Topic 4. Visualization of medical and biological data.

Lesson №6

Tasks to study the topic

Task 1.

Find the quantity of patients in each department. Build the pie chart according to the received data

Task 2.

Find the quantity of patients in each department by each gender separately. Build column chart according to the received data

Task 3.

Build the graph of the function $y = x^2 - 5$ for $x \in [-5;5]$ with $\Delta x = 0{,}5$.

Task 4.

Build the graph of the function $y=cos(3x+2)$ for 25 points in the range $[-2\pi;2\pi]$.

Task 5.

Dissolution medicinal substance from the tablet in the human body

Tablet mass m with time t dissolves in the human body. The rate of reduction of the weight of the dm/dt tablet over time is proportional to m.

$$\frac{dm}{dt} = -km.$$

where k is constant of dissolution. which depends on the type of pill.

$$m = m_0 e^{-kt}$$

1. Modulate the law of dissolution of the drug from a pill with an initial weight m_0=500 mg in the human body for the following values of the coefficient k :

k =	0,1	0,2	0,3

in the time range t ∈ [0;50] with Δt = 0,5 min;

2) Find the value k . if known that half a tablet was dissolved in 10 minutes. Model the law of dissolution pill for the found value k at t ∈ [0;30] with a step 0,5 min.

$$m = m_0 e^{-kt}$$
$$m(10) = m_0/2$$
$$m_0/2 = m_0 e^{-k10}$$
$$1/2 = e^{-10k}$$
$$ln(1/2) = -10k$$
$$k = \frac{-ln(1/2)}{10}$$

Task 6.

Build the graph of the function $y = y(x)$. if

$x = r\cos t$

$y = r\sin t$

where

$$r = \frac{\sin t\sqrt{|\cos t|}}{\sin t + \frac{7}{5}} - 2\sin t + 2$$

.

t build for 500 points in the range $[-2\pi;2\pi]$

Task 7.

Build the graph of the function $y = y(x)$. if

$$x = 6{,}2\left(\cos t - \frac{\cos 3{,}1t}{3{,}1}\right)$$

.

$$y = 6{,}2\left(\sin t - \frac{\sin 3{,}1t}{3{,}1}\right)$$

.

t build for 2000 points in the range $[0;20\pi]$

Topic 7. Computer data: processing and management.

Lesson №10

Tasks to study the topic

Task 1.

In 4 states a natural disaster took place. There are 20 victims in the first region. 5 victims in the second and the fourth regions and 10 victims in the third. The victims are being transported to three hospitals. There are 15 vacant places in the first and the second hospitals and there are 20 in the third. The cost of a patient transportation from the area of the natural disaster to the hospital is presented in the table below.

	State №1	State №2	State №3	State №4
Hospital №1	5	6	3	9
Hospital №2	6	4	7	5
Hospital №3	2	5	3	8

Minimize the cost to transport of patients.

Task 2.

Athlete must train daily three muscle groups. Workout abdominal muscles should take a1 = 2 hours. for a day. biceps training - a2 = 1 hour.. torso muscles - a3 = 2 hours. An athlete can practice in three gyms. In the first room. the daily training of an athlete lasts b1 = 0.5 hours. in the second - b2 = 2 hours. in the third - b3 = 2.5 hours. The energy expenditure (kcal) of an athlete during the training of each muscle group in the appropriate gym is shown in the table:

	Abdominal muscles	**Biceps**	**Torso muscles**
Gym №1	100	300	100
Gym №2	150	200	500
Gym №3	250	100	200

Draw an athlete training program so that:

1) the athlete spent the maximum amount of energy daily.

2) the athlete spent the minimum amount of energy daily.

Task 3.

Daily human need in vitamin A is 9 mg. in vitamin B - 8 mg. in vitamin C - 20 mg. In 1 kg of apples contains 3 mg of vitamin A. 1 mg of vitamin B. 1 mg of vitamin C. In 1 kg of cabbage contains 1 mg of vitamin A. 2 mg of vitamin B. 6 mg of vitamin C. 1 kg of apples costs 18 UAH.. 1 kg cabbage costs 14.20 UAH. How to get at least a daily dose of all vitamins at a minimal cost?

Task 4

In laboratory doctor has the following number of cups for growing microorganisms: bismuth-sulfite agar (BSA) - 5 pcs.. Meat-peptone agar (MPA) - 10 pcs.. Mannitol salt agar (MSA) - 5 pcs.. bloody MPA - 4 pcs.. ENDO - 3 pcs.

He needs to sow on these cups microorganisms of the families Esherihia. Salmonella. Staphylococcus Streptococcus. The number of strains is respectively 7. 6. 8. 6. The selectivity of the environment (environmental suitability for sowing this type of microorganism) is given in the following table.

	BSA	**MPA**	**MSA**	**bl.MPA**	**ENDO**
Esherihia	1	5	0	1	5
Salmonella	5	0	0	0	5
Staphylococcus	0	1	5	5	0
Streptococcus	0	1	0	5	0

Help to doctor make an optimal plan for growing microorganisms on cups with environments.

Task 5

At the point of blood transfusion is available: the blood of the first group **a1** = 500 ml. the second group **a2** = 100 ml. the third group **a3** = 50 ml. the fourth group **a4** = 50 ml. For transfusion necessary the blood of the first group is **b1** = 400 ml. the second group **b2** = 200 ml. the third group **b3** = 50 ml. the fourth group **b4** = 50 ml. The effectiveness of a blood transfusion given in the table below:

Group of blood		**Donor**			
		I	**II**	**III**	**IV**
Recipient	**I**	5	0	0	0
	II	1	5	0	0
	III	1	0	5	0
	IV	1	1	1	5

where 0 - blood is incompatible. can not be transfused. 1 - blood is compatible. can be transfused. 5 - the blood of the same group. ideal for transfusion.

Make a plan for blood transfusion to maximize the effectiveness of the transfusion.

Topic 8. Methods of biostatistics

Lesson №12

Tasks to study the topic

Task 1.

As a result of the clinical study. the following results of AsAT were obtained:

Before treatment Treatment A	Before treatment Treatment B	After treatment Treatment A	After treatment Treatment B	Healthy
1,01	0,85	0,79	0,83	0,77
0,88	0,99	0,89	0,87	0,71
0,85	0,85	0,8	0,63	0,76
0,85	0,85	0,95	0,72	0,82
0,84	0,91	0,84	0,81	0,71
0,81	0,91	0,94	0,81	0,69
0,95	0,87	0,91	0,8	0,7
0,85	1	0,91	0,81	0,76
0,88	0,91	0,9	0,77	0,75
0,9	0,93	0,94	0,83	0,74
0,97	0,83	0,89	0,77	0,69
0,87	0,93	0,87	0,8	0,83
0,81	0,93	0,85	0,79	0,76
0,81	0,91	0,95	0,8	0,79
0,92	0,92	0,95	0,7	0,68
0,83	0,88	0,89	0,79	0,74
0,75	0,79	0,88	0,76	0,73
0,82	0,98	0,88	0,67	0,74
0,87	0,93	0,92	0,77	0,74
0,87	0,96	0,93	0,78	0,83
0,83	0,97	0,79	0,72	0,72
0,93	0,86	0,94	0,75	0,81
0,8	0,81	0,92	0,78	0,76

0,94	0,99	0,94	0,78	0,78
0,92	0,88	0,93	0,71	0,85
0,89	1	0,87	0,75	0,86
0,94	0,94	0,93	0,78	0,7
0,86	0,88	0,96	0,68	0,78
1,03	0,94	0,82	0,75	0,73
0,91	0,96	0,93	0,8	0,8
0,9	0,93	0,84	0,69	0,78
0,94	0,93	0,87	0,75	0,77
0,91	0,87	0,95	0,82	0,69
0,76	0,96	0,91	0,8	0,83
0,86	1,11	0,97	0,83	0,76
0,79	0,88	0,84	0,8	0,78
0,91	0,95	0,93	0,73	0,72
0,87	0,83	1,02	0,84	0,8
0,9	0,92	0,92	0,69	0,78
0,77	0,9	0,83	0,72	0,69
				0,8
				0,76
				0,73
				0,71
				0,83
				0,71
				0,75
				0,66
				0,74
				0,81

1. Find the base statistics for each sample

[Learn more about Mean, Median, Mode, St.Deviation, Range]

Lean more about Skewness

2. Build the histogram for each sample

3. Check the distribution of samples for normal.

Learn more about normal distribution

4. Determine which treatment is effective by comparing:

a. AsAT before treatment with treatment A and AsAT healthy;
b. AsAT before treatment with treatment A and AsAT after treatment with treatment A;
c. AsAT after treatment with treatment A and AsAT healthy;

d AsAT before treatment with treatment B and AsAT healthy;

e. AsAT before treatment with treatment B and AsAT after treatment with treatment B;
f. AsAT after treatment with treatment B and AsAT healthy;

Notes

Excel Statistical functions

AVERAGE – Returns the average of its arguments
COUNT – Counts how many numbers are in the list of arguments
KURT – Returns the kurtosis of a data set
MAX – Returns the maximum value in a list of arguments
MEDIAN – Returns the median of the given numbers
MIN – Returns the minimum value in a list of arguments
SKEW – Returns the skewness of a distribution
STDEV – Estimates standard deviation based on a sample
VAR – Estimates variance based on a sample
All descriptive statistical information: Data | Data Analysis | Descriptive Statistics
Histogram: Data | Data Analysis | Histogram

Checking distribution for normality

1. According to the main statistics

The simple's distribution is normal, if:

1. Mean=Median=Mode
2. Skewness->0
3. Kurtosis ->0

n	Skewness	Kurtosis
50	0,53	1,05
100	0,39	0,82
200	0,28	0,63
500	0,18	0,43
1000	0,13	0,32

2. The 3σ criteria.
The simple's distribution is normal, if:

1. inequality $\left|x_i - \bar{x}\right| < 3\sigma$ is correct for 99,7% of variants
2. inequality $\left|x_i - \bar{x}\right| < \sigma$ is correct for 68,3% of variants
3. inequality $\left|x_i - \bar{x}\right| < 0{,}625\sigma$ is correct for 50% of variants

3. The criteria of MAD (mean absolute deviation)

If $\left|\frac{MAD}{\sigma} - 0{,}7979\right| < \frac{0{,}4}{\sqrt{n}}$, were $MAD = \frac{\sum|x_i - \bar{x}|}{n}$,

the distribution is normal.

Comparing samples

Dependent samples			
FTEST			
FTEST>0,05 (variances are equal)		**FTEST<0,05** (variances are different)	
TTEST (Type=1)		**TTEST** (Type=1)	
TTEST>0,05 (means are equal)	**TTEST<0,05** (means are different)	**TTEST>0,05** (means are equal)	**TTEST<0,05** (means are different)
Samples are equal	***Samples are different***	***Samples are different****	***Samples are different***
Independent Samples			
FTEST			
FTEST>0,05 (variances are equal)		**FTEST<0,05** (variances are different)	
TTEST (Type=2)		**TTEST** (Type=3)	
TTEST>0,05 (means are equal)	**TTEST<0,05** (means are different)	**TTEST>0,05** (means are equal)	**TTEST<0,05** (means are different)
Samples are equal	***Samples are different***	***Samples are different****	***Samples are different***

Topic 9. Evidence-based medicine

Lesson №14

Tasks to study the topic

Task 1.

Learn more about correlation

Using the **Pearson correlation** coefficient, determine the strength and significance of the correlation connection. construct a direct regression for the following data:

Red blood cells	Hemoglobin
2,35	105,50
2,42	109,02
2,46	110,13
2,65	112,05
2,65	116,76
2,69	113,15
2,70	113,57
2,75	113,58
2,75	114,05
2,82	114,47
2,84	114,72
2,88	117,42
2,93	115,39
2,94	115,52
2,96	116,35
3,01	116,61
4,02	116,74
3,09	113,05
3,11	116,78
3,17	117,09

3,04	117,14
3,25	115,12
3,28	117,94
3,29	118,13
4,33	118,34
3,33	119,04
3,33	120,74
3,39	119,24
3,44	119,78
3,46	119,84
3,47	120,09
3,49	119,19
3,51	126,70
3,54	120,96
3,54	121,25
3,57	122,28
3,57	122,66
3,58	122,69
3,60	122,70
3,63	122,76
3,65	123,44
3,72	124,33
3,84	130,96
3,86	126,20
3,93	126,48
3,95	126,55
3,99	120,90

4,11	128,18
4,26	129,73
4,89	124,38

Task 2.

Using the **Spearmen's correlation** coefficient. determine the strength and significance of the correlation connection. construct a direct regression for the following data:

Parameter 1	Parameter 2
0,1032	2,045
0,0533	2,1046
0,1618	2,2122
0,5838	2,5566
0,6269	2,6914
0,6687	2,8097
0,6726	3,0594
0,4119	3,279
0,4143	3,3611
0,4003	3,4324
0,4741	3,5646
0,4791	3,5853
0,191	3,8539
0,2006	3,9945
0,2399	4,1676
0,258	4,2055
0,7772	4,4464
0,9635	4,5923
0,9839	4,6838
0,9995	4,8241

Task 3.

At the level of significance α = 0.05. using the method of ANOVA. Check the effectiveness of the β-blocker effect on the heart rate (beats/min) according to the results presented in the table. Determine the force of influence of this factor

15 mg	60 mg	120 mg	180 mg
67	76	80	83
68	76	80	83
68	76	80	83
70	76	80	83
72	76	81	83
78	76	81	84
78	76	81	84
78	76	81	84
78	72	81	85
78	72	81	85
78	72	81	85
78	72	81	86
78	72	81	86
78	72	81	87
78	72	82	87
78	72	82	88
78	72	82	89
75	72	82	89
75	72	82	
75	72	82	
75	72	82	
	79	82	
	79	90	
	79	90	
	79	90	
	79	91	
	79		
	79		
	79		
	79		
	79		
	79		
	79		
	80		
	80		

Correlation Analysis

Correlation coefficient	Linear relationship
$0,7 < \|r\| \le 1$	strong
$0,5 < \|r\| \le 0,7$	medium
$0,3 < \|r\| \le 0,5$	moderate
$0,2 < \|r\| \le 0,3$	weak
$\|r\| \le 0,2$	absent

Pearson correlation (Normal distribution)	Spearmen correlation (Nonnormal distribution)
CORREL()	$r = 1 - \frac{6\sum d^2}{n^3 - n}$
$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$	

p=TDIST(t;n-2;2)

ANOVA

Extensions -> XLMiner Analysis ToolPack -> ANOVA Single factor

If $P<0.05$, the null hypothesis is rejected

$$h_x^2 = \frac{MS_{between\ groups} - MS_{whithin\ groups}}{MS_{between\ groups} - MS_{whithin\ groups} + n \cdot MS_{whithin\ groups}},$$

$$\bar{n} = \frac{1}{m-1}\left(N - \frac{\sum (q_i)^2}{N}\right)$$

were m – quantity of the samples, q_i – size of each sample, N – the total quantity of variances (the size of complex).

Topic 10. Individual medical cards. Structuring the content of electronic medical cards

Lesson №16

Tasks to study the topic

Task 1.

Create a blank report in LookerStudio.

Use the Base for LookerStudio file from Google Sheets as the data source.

Task 2.

Create a new report page to display the number of men and women by departments.

Add charts to the page

Task 3.

Create a new report page that displays patient diagnosis information. Add a drop-down list to allow the user to select the required department.

Task 4.

Display information about the age of patients on the new page of the report. Add an advanced filter by Doctor's name

Task 5.

Create a new page to present information about the average hemoglobin by department

Task 6.

Create a new page to present information about adult female patients of the Therapeutic or Surgical Department.

Task 7.

Create a new page to present information about women aged 21-31 with normal cortisol

Topic 11. Types of information systems in healthcare industry. Hospital information systems and their development

Lesson №18

Tasks to study the topic

Task 1.

Create a new report page to display information about patients diagnosed with Hypertension or Myocardial infarction. Find the difference between systolic and diastolic blood pressure.

Task 2.

Create a new page with information about pregnant women who don’t smoke. Determine the trimester of pregnancy for each woman.

Task 3.

Create a new page to check if patients' hemoglobin is normal (normal value for Men is 140. for Women is 120).

Task 4.

Create a new page. For each patient find how much his/her temperature is greater than 36

Task 5.

On the new page of the report display information about the names of patients and their addresses. Add Map Chart and Google Map. displaying the quantity of patients in each region.

Task 6.

Create a report page showing the average hemoglobin of male patients at the map

Task 7.

Create a report page showing the number of different diagnoses at the map

Task 8.

Create a report page showing the quantity of smokers at the map