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MSC 97I99

CREDIT TESTS FOR SECTION "FUNCTIONS" (FOR SECONDARY VOCATIONAL EDUCATION

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The article describes some examples of credit tests for the section "functions"which can be used in the process of teaching for the students of secondary vocational education. Credit tests allow the teachers to make summative assessment on the sections "function graphs "function domain and range "function study.

Key words: credit test, functions, function graphs, function study, summative assessment

Introduction

Academic performance rating is an important aspect of teaching and learning process in the system of secondary vocational education. Only when this assessment is organized properly, the learning goals can be achieved.

The paper presents 3 credit tests for the second part of «Mathematics» discipline. The content corresponds to the Federal State Educational Standard.

Correct solution of tasks allows the students to receive a «credit» for a subject material and the teacher to provide the systematic assessment of academic performance.

The credit tests are compiled so that all the students have enough time (30-60 minutes) to complete the work. These tests are carried out only during classes, so they do not contain answers. Then a teacher checks the credit works of the students.

The credit tests are presented in eight variants. They are almost similar in complexity. The content of the tasks is the basic and typical for each section.

The tasks are arranged on a «simple-to-complex» basis and their number is different in the tests. Thus, we assume that a teacher may choose the tasks taking into account the level of preparation of students on the subject and the time for the credit test. A teacher may also make any changes based on the profile and line of teaching.

Examples of credit tests

Credit test №1 on the section «Function graphs»

Variant 1

1. Indicate the graph (Fig. 1) which corresponds to an uneven function

2. Figure 2 illustrates a graph of temperature change. How many hours was the temperature more than 12 degrees?

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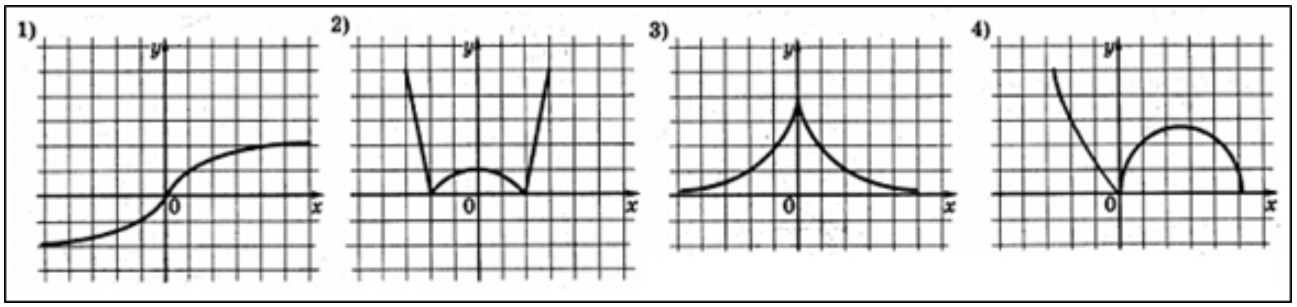

Fig. 1. Function graphs for task 1

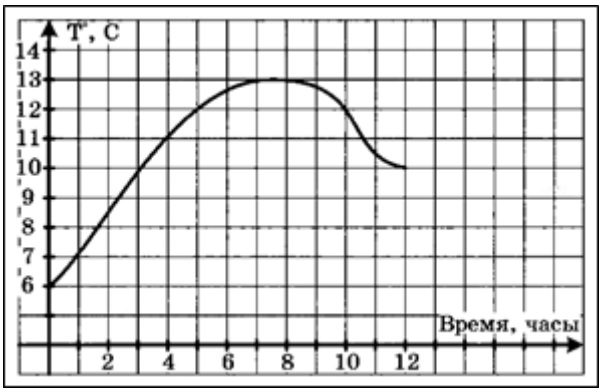

Fig. 2. Graph of temperature change

3. The heavy points in Figure 3 indicate oil price at the closure of exchange on all the workdays from April 4 to 19, 2002. The horizontal line shows the dates and the vertical line shows the price of a barrel of oil in US dollars. For clarity, the heavy points are joined by a line. Determine from the figure the highest price of oil at the closure of exchange within the indicated period (in US dollars for a barrel).

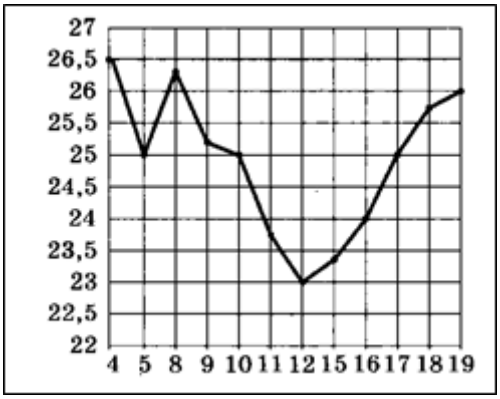

Fig. 3. Graph of oil price in April 2002

4. The diagram (Fig. 4) illustrates the number of web visitors of RIA «Novosti» site on all days from November 10 to November 29, 2009. The horizontal line shows the dates and the vertical line shows the number of visitors per a day. Determine form the diagram how many days the RIA «Novosti» site was visited by more than 700000 visitors.

Variant 2

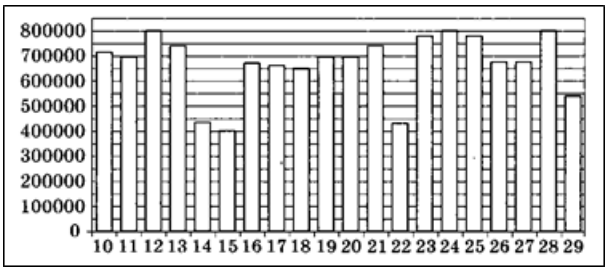

Fig. 4. Diagram of web visitor number of RIA «News» in November, 2009

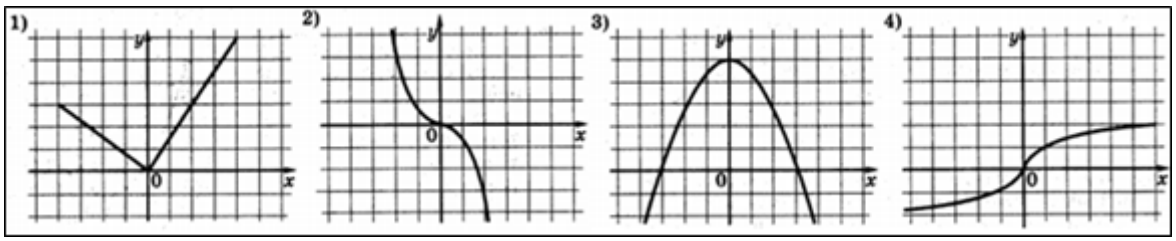

Fig. 5. Function graphs for task 1

1. Indicate the graph (Fig. 5), which corresponds to an even function

2. In figure 6, the heavy points show the oil price at the closure of exchange on all the workdays from August 17 to 31, 2004. The horizontal line shows the dates and the vertical line shows the price of a barrel of oil in US dollars. For clarity, the heavy points are joined by a line. Determine from the figure the least price of oil at the closure of exchange within the indicated period (in US dollars for a barrel).

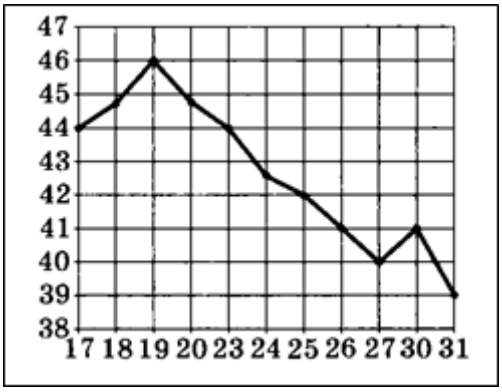

Fig. 6. Graph of oil price in August 2004

3. Figure 7 illustrates a graph of temperature change. How many hours was the temperature less than 26 degrees?

4. The diagram (Fig. 8) illustrates the number of web visitors of RIA «Novosti» site on all days from November 10 to 29, 2009. The horizontal line shows the dates and the vertical line shows the number of visitors per a day. Determine form the diagram how many times the visitor number of the RIA «Novosti» site possessed the highest value.

Variant 3

1. Indicate the graph (Fig. 9), which correspond to an uneven function

2. Figure 10 illustrates a graph of temperature change. How many hours was the temperature more than 8 degrees?

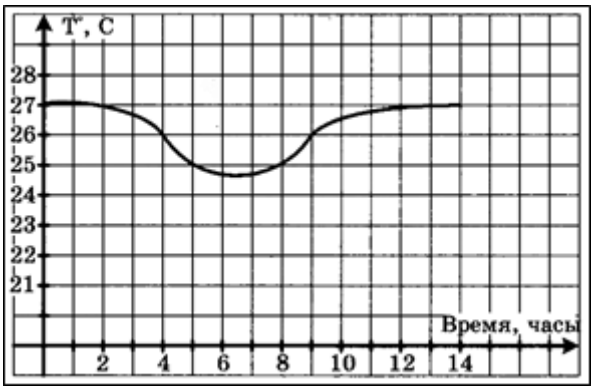

Fig. 7. Graph of temperature change

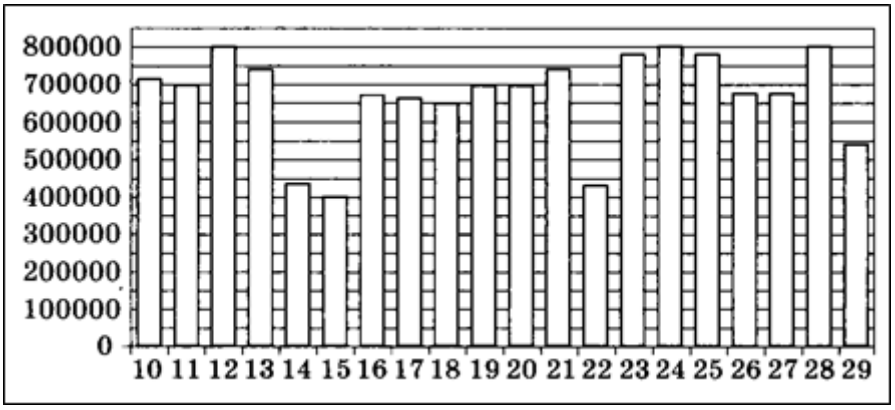

Fig. 8. Diagram of the visitor number of RIA «Novosti» site in November 2009

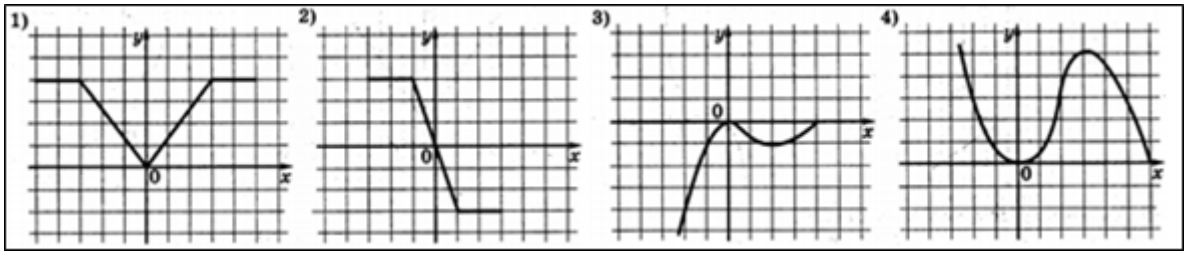

Fig. 9. Function graphs for task 1

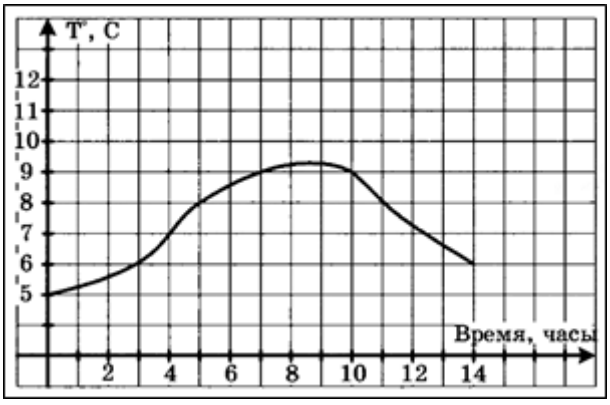

Fig. 10. Graph of temperature change

3. In figure 11, the heavy points show the nickel price at the closure of exchange on all the workdays from May 6 to 20, 2009. The horizontal line shows the dates and the vertical line shows the price of a ton of nickel in US dollars. For clarity, the heavy points are joined by a line. Determine from the figure the lowest price of nickel at the closure of exchange within the indicated period (in US dollars for a ton).

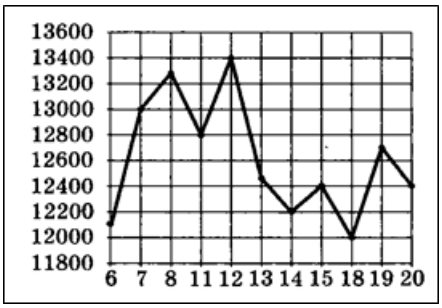

Fig. 11. Graph of nickel price in May 2009

4. The diagram (Fig. 12) illustrates the number of web visitors of RIA «Novosti» site within each hour on December 8, 2009. The horizontal line shows the hours and the vertical line shows the number of visitors per an hour. Determine form the diagram how many hours the visitor number of the RIA «Novosti» site was not less than 30000.

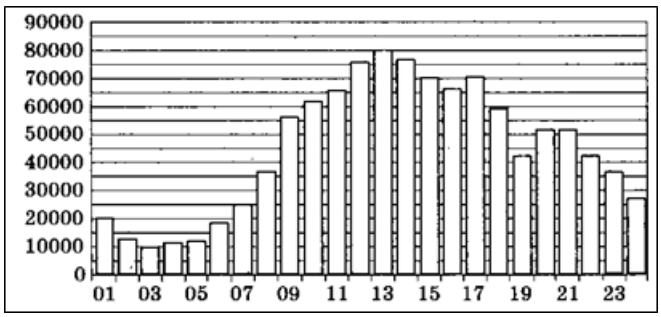

Fig. 12. Diagram of the visitor number of RIA «Novosti» site in December 2009

Variant 4

1. Indicate the graph (Fig. 13), which corresponds to an even function

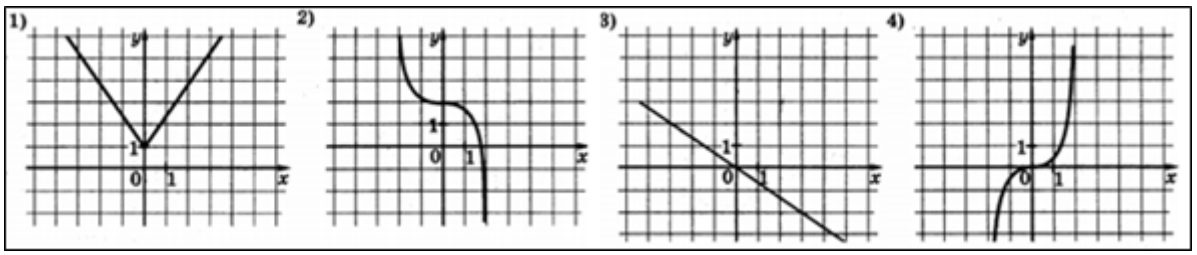

Fig. 13. Function graphs for task 1

2. Figure 14 illustrates a graph of temperature change. How many hours was the temperature more than 22 degrees?

3. In figure 15, the heavy points show the nickel price at the closure of exchange on all the workdays from May 6 to 20, 2009. The horizontal line shows the dates and the vertical line

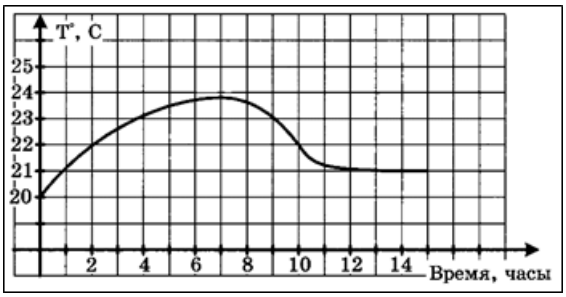

Fig. 14. Graph of temperature change

shows the price of a ton of nickel in US dollars. For clarity, the heavy points are joined by a line. Determine from the figure the difference between the highest and the lowest price of nickel at the closure of exchange within the indicated period (in US dollars for a ton).

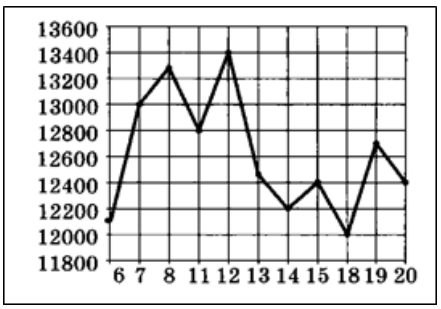

Fig. 15. Graph of nickel price in May 2009

4. The diagram (Fig. 16) illustrates the number of web visitors of RIA «Novosti» site within each hour on December 8, 2009. The horizontal line shows the hours and the vertical line shows the number of visitors per an hour. Determine form the diagram the largest number of visitors per an hour on RIA «Novosti» site.

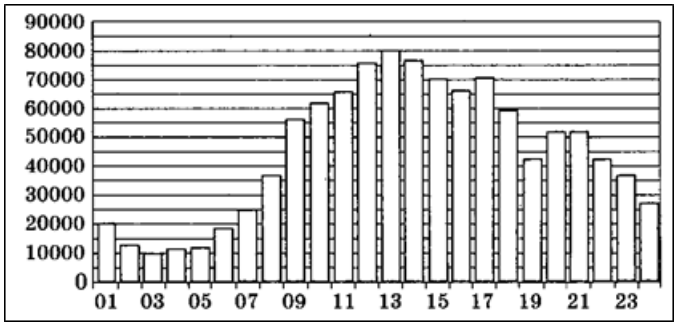

Fig. 16. Diagram of the number of visitors of RIA «Novosti» site in December 2009

Variant 5

1. Indicate the graph (Fig. 17), which corresponds to an uneven function:

2. Figure 18 illustrates a graph of temperature change. How many hours was the temperature less than 15 degrees?

3. In figure 19, the heavy points show the tin price at the closure of exchange on all the workdays from September 3 to 18, 2007. The horizontal line shows the dates and the vertical line shows the price of a ton of tin in US dollars. For clarity, the heavy points are joined by a

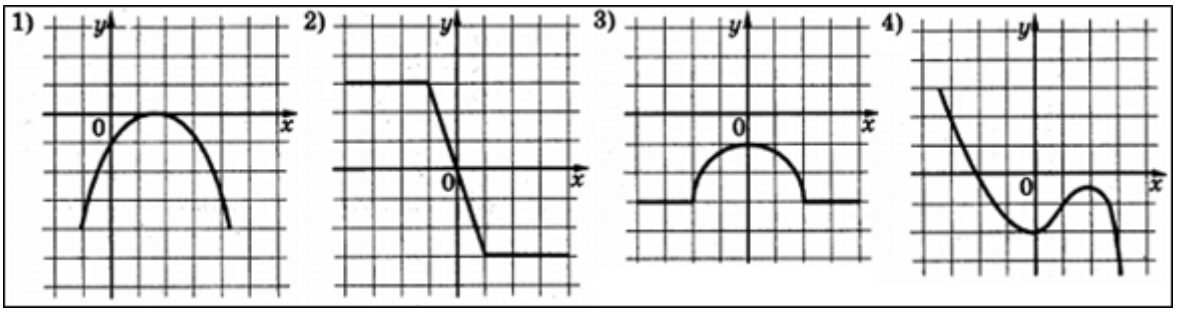

Fig. 17. Graphs of functions for task 1

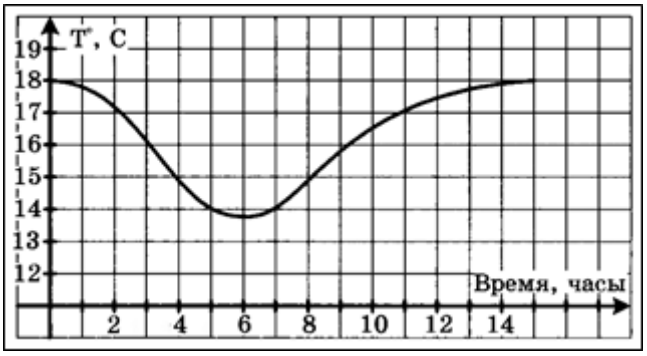

Fig. 18. Graph of temperature change

line. Determine from the figure the date when the price of tin at the closure of exchange was the highest within the indicated period.

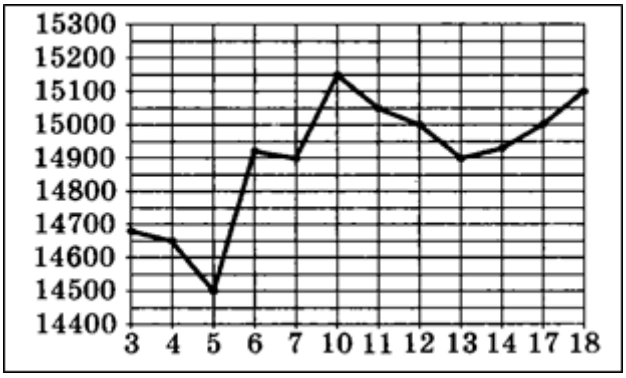

Fig. 19. Graph of tin price in September 2007

4. The diagram (Fig. 20) shows the number of solar flares for each day from November 11 to 21, 2001. Determine from the figure the largest number of flares.

Variant 6

1. Indicate the graph (Fig. 21), which corresponds to an even function:

2. Figure 22 illustrates a graph of temperature change. How many hours was the temperature more than 10 degrees?

3. In figure 23, the heavy points show the tin price at the closure of exchange on all the workdays from September 12 to 28, 2007. The horizontal line shows the dates and the vertical line shows the price of a ton of tin in US dollars. For clarity, the heavy points are joined by a

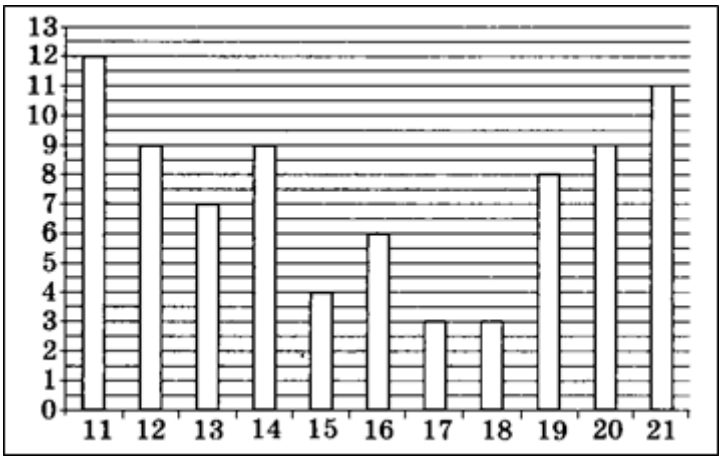

Fig. 20. Diagram of the solar flare number in November 2001

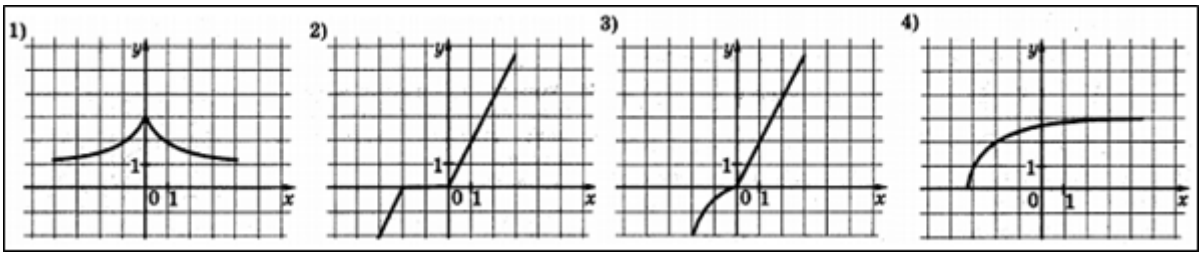

Fig. 21. Graphs of functions for task 1

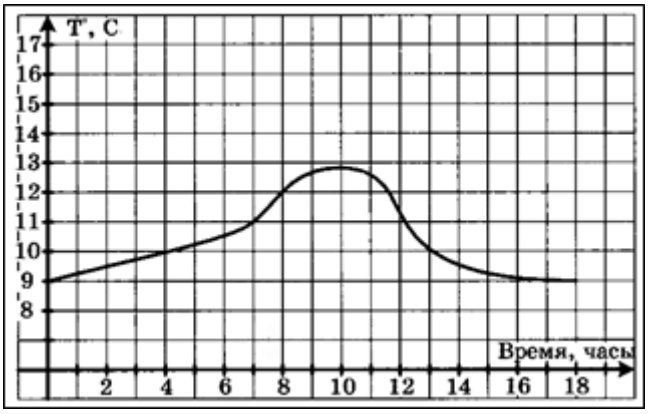

Fig. 22. Graph of temperature change

line. Determine from the figure the date when the price of tin at the closure of exchange was less than 165000 US dollars for a ton within the indicated period.

4. The diagram (Fig. 24) shows the number of solar flares for each day from November 11 to 21, 2001. Determine from the figure how many times the flare number reached its lowest value within these 10 days.

Variant 7

1. Indicate the graph (Fig. 25), which corresponds to an uneven function:

2. Figure 26 illustrates a graph of temperature change. How many hours was the temperature less than 19 degrees?

3. In figure 27, the heavy points show the nickel price at the closure of exchange on all the workdays from November 10 to 26, 2008. The horizontal line shows the dates and the vertical

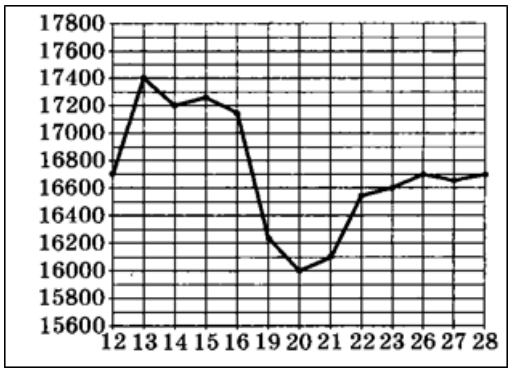

Fig. 23. Graph of tin price in November 2007

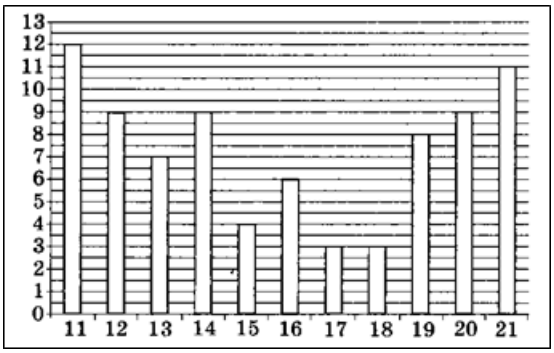

Fig. 24. Diagram of the solar flare number in November 2001

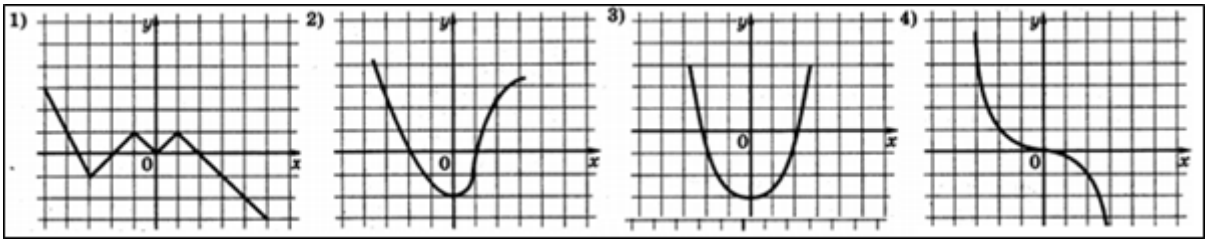

Fig. 25. Graphs of functions for task 1

line shows the price of a ton of nickel in US dollars. For clarity, the heavy points are joined by a line. Determine from the figure the difference between the highest and the lowest price of nickel at the closure of exchange within the indicated period (in US dollars for a ton).

4. The diagram (Fig. 28) shows the number of solar flares for each day from November 11 to 21, 2001. Determine from the figure the difference between the largest and the least number of flares within these 11 days.

Variant 8

1. Indicate the graph (Fig. 29), which corresponds to an even function:

2. In figure 30, the heavy points show the nickel price at the closure of exchange on all the workdays from November 10 to 26, 2008. The horizontal line shows the dates and the vertical line shows the price of a ton of nickel in US dollars. For clarity, the heavy points are joined by a line. Determine from the figure the date when the price of nickel at the closure of exchange was the highest within the indicated period (in US dollars for a ton).

3. Figure 31 illustrates a graph of temperature change. How many hours was the temperature less than 9 degrees?

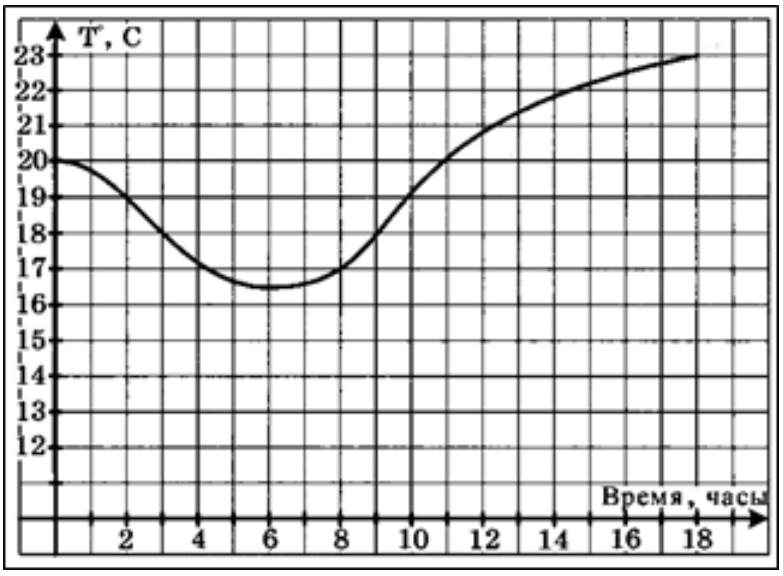

Fig. 26. Graph of temperature change

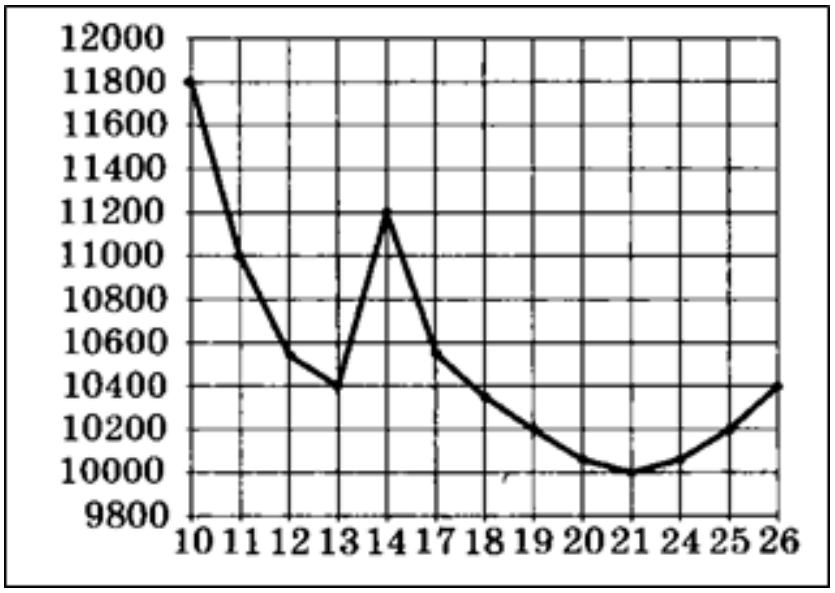

Fig. 27. Graph of nickel price in November 2008

4. The diagram (Fig. 32) shows the number of solar flares for each day from November 11 to 21, 2001. Determine from the figure how many times the largest number is bigger than the least number.

Credit test №2 on the section «FunctionsFunctions »

Variant 1

1. Define an affine function $y = kx + b$ by a formula which graph passes through the points $A(-1;2)$ and $B(0;1,6)$.

2. Find the domain of the functions

$$\text{a) } y = \frac{x+4}{2-5x};$$

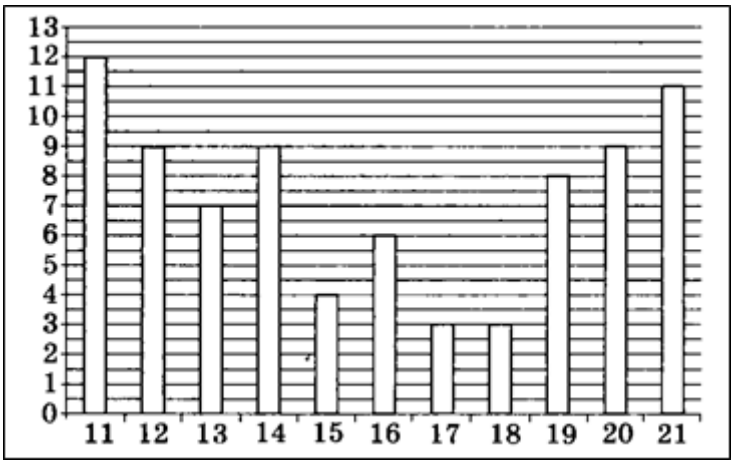

Fig. 28. Diagram of the solar flare number in November 2001

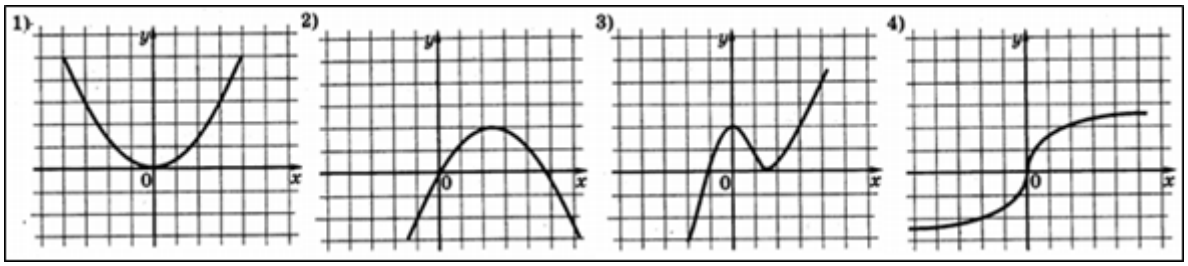

Fig. 29. Graphs of functions for task 1

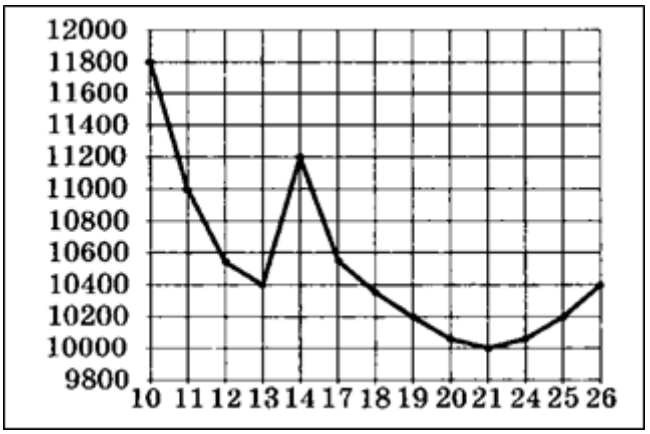

Fig. 30. Graph of nickel price in November 2008

б) $y = \sqrt{-x^2 + 6x - 5}$;

в) $y = \log_{0,5}(3 + 2x)$.

3. Find the range of the functions

а) $y = -5\cos x$;

б) $y = 2^x - 3$.

Variant 2

1. Define an affine function $y = kx + b$ by a formula which graph passes through the points $A(0;-5)$ and $B(1;-3)$.

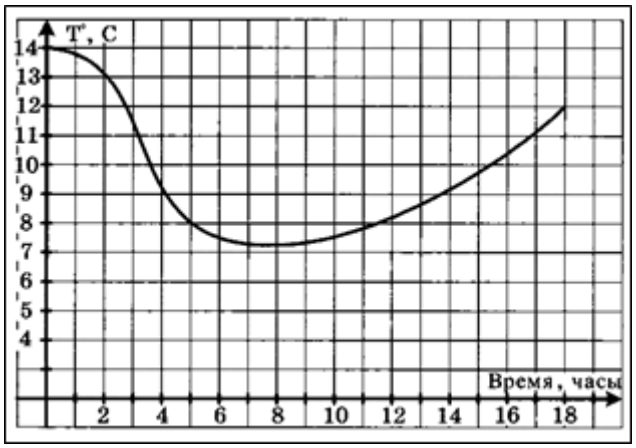

Fig. 31. Graph of temperature change

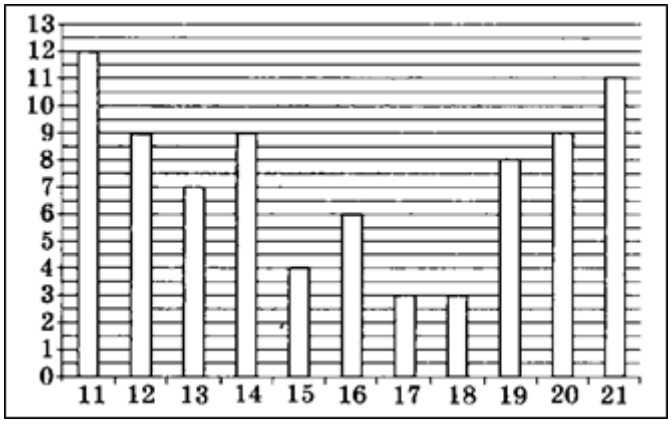

Fig. 32. Diagram of the solar flare number in November 2001

2. Find the domain of the functions

$$\text{а) } y = \frac{3x+5}{5^2-7+2};$$

$$\text{б) } y = \sqrt{21+7};$$

$$\text{в) } y = \log_{0,3}(5x-1).$$

3. Find the range of the functions

$$\text{а) } y = 5+\cos x;$$

$$\text{б) } y = 8^x - 9.$$

Variant 3

1. Define an affine function $y = kx + b$ by a formula which graph passes through the points A (0; 5) and B (1; 7).

2. Find the domain of the functions

$$\text{а) } y = \frac{5x+4}{2+x};$$

$$\text{б) } y = \sqrt{x^2-2-3};$$

$$\text{в) } y = \log_{0,8}(4-5x).$$

3. Find the range of the functions

а) $y = 2 + \sin x$;

б) $y = 7 + 3^x$.

Variant 4

1. Define an affine function $y = kx + b$ by a formula which graph passes through the points A (0;-4) and B (2; -3).

2. Find the domain of the functions

а) $y = \frac{x - 12}{2^2 + 3 - 5}$;

б) $y = \sqrt{2x + 5}$;

в) $y = \log_{0,2}(3x + 6)$.

3. Find the range of the functions

а) $y = -7\sin x$;

б) $y = 5^x - 4$.

Variant 5

1. Define an affine function $y = kx + b$ by a formula which graph passes through the points A (0;-3) and B (1; -1).

2. Find the domain of the functions

а) $y = \frac{3 + 7}{2 - 4}$;

б) $y = \sqrt{x^2 + 2x - 3}$;

в) $y = \log_{0,1}(5 - 10x)$.

3. Find the range of the functions

а) $y = -3\sin x$;

б) $y = 4^x - 3$.

Variant 6

1. Define an affine function $y = kx + b$ by a formula which graph passes through the points A (0; 3) and B (1; 1).

2. Find the domain of the functions

а) $y = \frac{3 - 4}{3^2 + 5x - 2}$;

б) $y = \sqrt{4 + 2}$;

в) $y = \log_{0,4}(28 - 4x)$.

3. Find the range of the functions

а) $y = 2\sin x - 1$;

б) $y = 6 + 8^x$.

Variant 7

1. Define an affine function $y = kx + b$ by a formula which graph passes through the points A (0; 2) and B (2; 1).

2. Find the domain of the functions

$$\text{а) } y = \frac{8-3}{6-2x};$$

$$\text{б) } y = \sqrt{-x^2 - 2x + 3};$$

$$\text{в) } y = \log_{0,6}(21 - 3x).$$

3. Find the range of the functions

$$\text{а) } y = 3 + \cos x;$$

$$\text{б) } y = 7^x - 8.$$

Variant 8

1. Define an affine function $y = kx + b$ by a formula which graph passes through the points A (0; -2) and B (1; -3).

2. Find the domain of the functions

$$\text{а) } y = \frac{3+4}{2^2-7+3},$$

$$\text{б) } y = \sqrt{18+3x},$$

$$\text{в) } y = \log_{0,8}(7x + 56).$$

3. Find the range of the functions

$$\text{а) } y = 4\sin x,$$

$$\text{б) } y = 6^x - 13.$$

Credit test №3 on the section ≪Function study ≫

Variant 1

1. From the graph of the function $= f(x)$ (Fig. 33) determine the following:
1) the function domain;
2) the function range;
3) zero of the function;
4) function constant sign intervals;
5) function critical points;
6) monotonicity interval;
7) function largest and least values.
2. Study the function $y = x^2 - 2x - 3$:
1) define the function domain;
2) find the points of intersection with coordinate axes;
3) find the parabola vertex coordinates;
4) construct the function graph;
5) determine the function constant sign intervals;

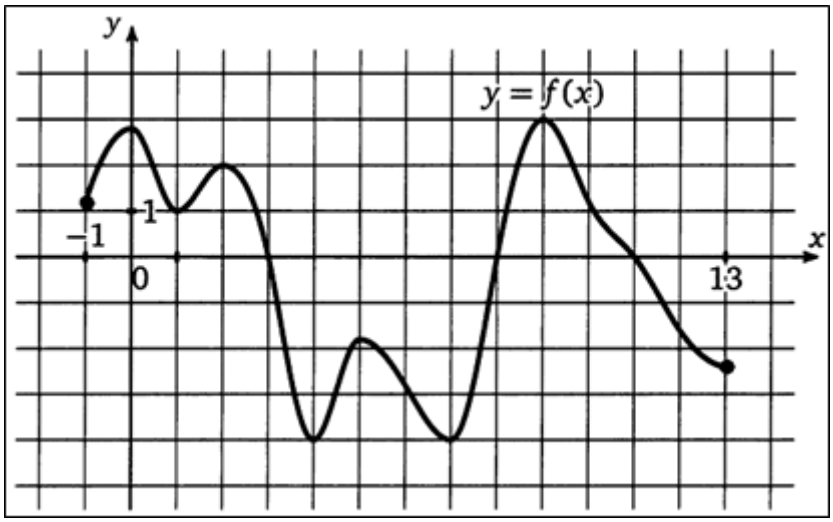

Fig. 33. Function graph for task 1

6) define the monotonicity intervals;
7) define the critical points of the function;
8) find the function largest and least values;
9) define the function range;
10) define the boundedness of the function;
11) define the function convexity.

Variant 2

1. From the graph of the function $= f(x)$ (Fig. 34) determine the following:
1) the function domain;
2) the function range;
3) zero of the function;
4) function constant sign intervals;
5) function critical points;
6) monotonicity interval;
7) function largest and least values.
2. Study the function $y = -x^2 + 4x - 3$:
1) define the function domain;
2) find the points of intersection with coordinate axes;
3) find the parabola vertex coordinates;
4) construct the function graph;
5) determine the function constant sign intervals;
6) define the monotonicity intervals;
7) define the critical points of the function;
8) find the function largest and least values;
9) define the function range;
10) define the boundedness of the function;
11) define the function convexity.

Variant 3

1. From the graph of the function $= f(x)$ (Fig. 35) determine the following:
1) the function domain;

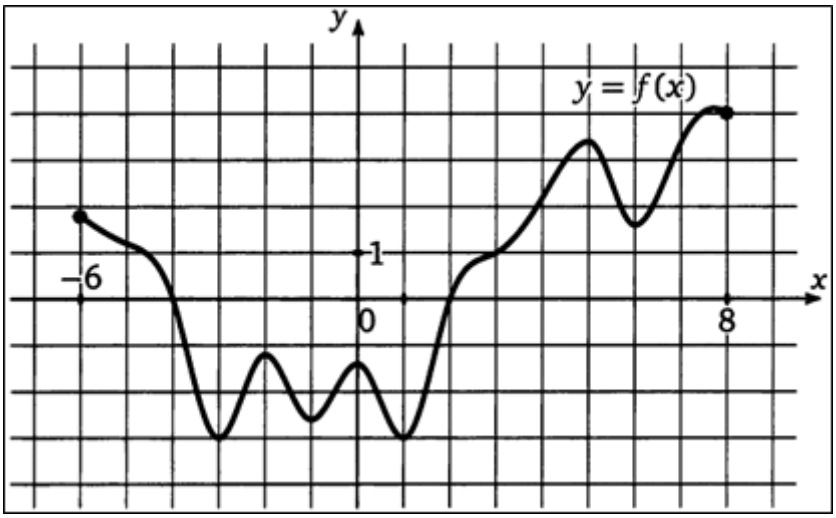

Fig. 34. Function graph for task 1

2) the function range;
3) zero of the function;
4) function constant sign intervals;
5) function critical points;
6) monotonicity interval;
7) function largest and least values.

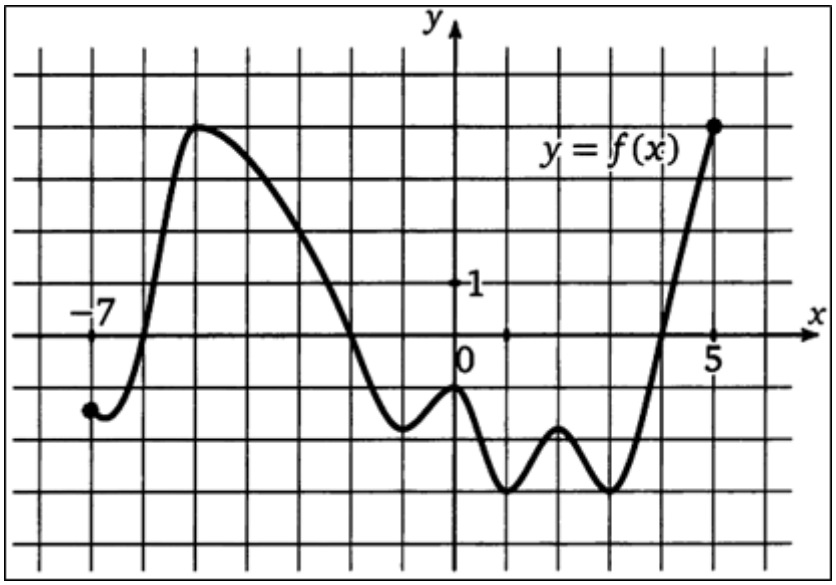

Fig. 35. Function graph for task 1

2. Study the function $y = -x^2 - 6x - 5$:
1) define the function domain;
2) find the points of intersection with coordinate axes;
3) find the parabola vertex coordinates;
4) construct the function graph;
5) determine the function constant sign intervals;
6) define the monotonicity intervals;
7) define the critical points of the function;

8) find the function largest and least values;
9) define the function range;
10) define the boundedness of the function;
11) define the function convexity.

Variant 4

1. From the graph of the function $= f(x)$ (Fig. 36) determine the following:
1) the function domain;
2) the function range;
3) zero of the function;
4) function constant sign intervals;
5) function critical points;
6) monotonicity interval;
7) function largest and least values.

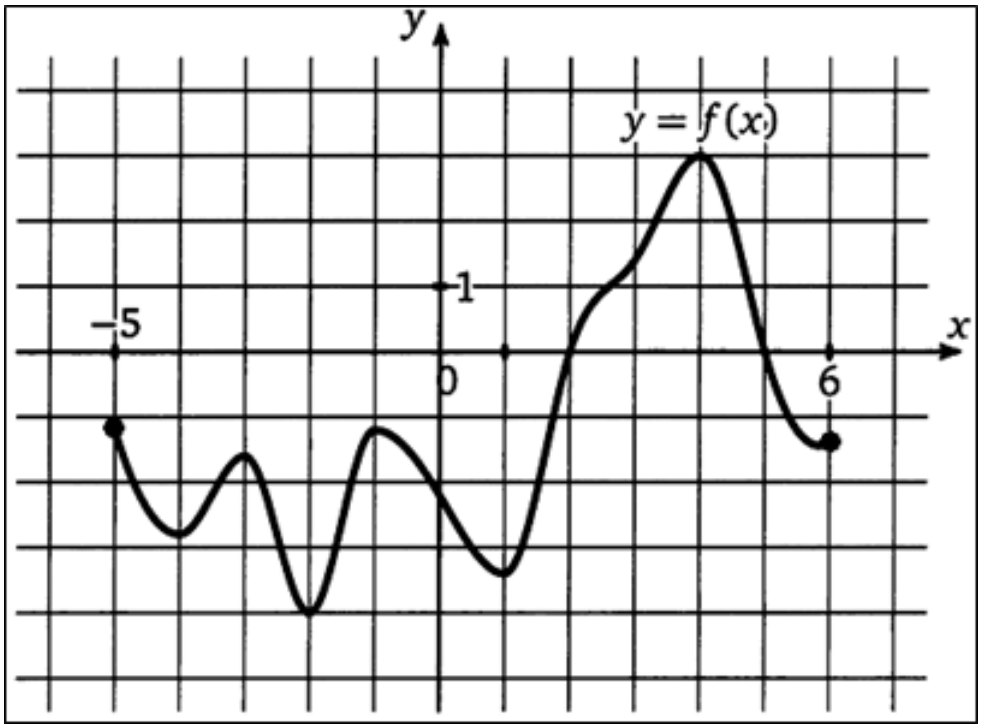

Fig. 36. Function graph for task 1

2. Study the function $y = x^2 - 4x + 3$:
1) define the function domain;
2) find the points of intersection with coordinate axes;
3) find the parabola vertex coordinates;
4) construct the function graph;
5) determine the function constant sign intervals;
6) define the monotonicity intervals;
7) define the critical points of the function;
8) find the function largest and least values;
9) define the function range;
10) define the boundedness of the function;
11) define the function convexity.

Variant 5

1. From the graph of the function $= f(x)$ (Fig. 37) determine the following:
1) the function domain;
2) the function range;
3) zero of the function;
4) function constant sign intervals;
5) function critical points;
6) monotonicity interval;
7) function largest and least values.

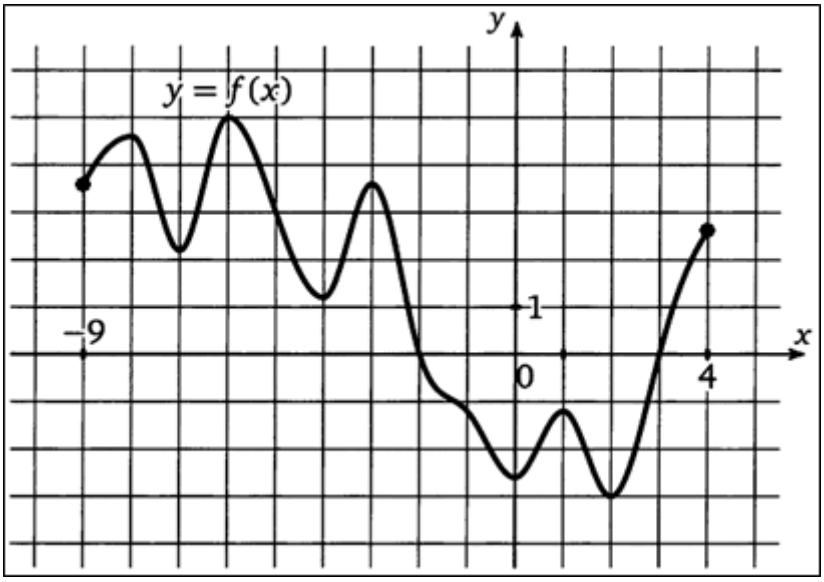

Fig. 37. Function graph for task 1

2. Study the function $y = -x^2 + 2x + 8$:
1) define the function domain;
2) find the points of intersection with coordinate axes;
3) find the parabola vertex coordinates;
4) construct the function graph;
5) determine the function constant sign intervals;
6) define the monotonicity intervals;
7) define the critical points of the function;
8) find the function largest and least values;
9) define the function range;
10) define the boundedness of the function;
11) define the function convexity.

Variant 6

1. From the graph of the function $= f(x)$ (Fig. 38) determine the following:
1) the function domain;
2) the function range;
3) zero of the function;
4) function constant sign intervals;
5) function critical points;
6) monotonicity interval;
7) function largest and least values.

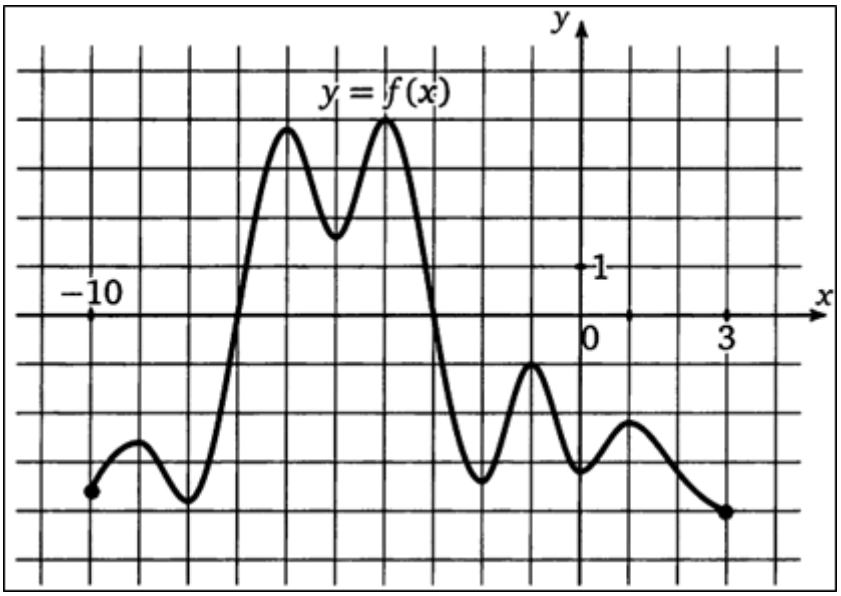

Fig. 38. Function graph for task 1

2. Study the function $y = -x^2 - 4x + 5$:
1) define the function domain;
2) find the points of intersection with coordinate axes;
3) find the parabola vertex coordinates;
4) construct the function graph;
5) determine the function constant sign intervals;
6) define the monotonicity intervals;
7) define the critical points of the function;
8) find the function largest and least values;
9) define the function range;
10) define the boundedness of the function;
11) define the function convexity.

Variant 7

1. From the graph of the function $= f(x)$ (Fig. 39) determine the following:
1) the function domain;
2) the function range;
3) zero of the function;
4) function constant sign intervals;
5) function critical points;
6) monotonicity interval;
7) function largest and least values.
2. Study the function $y = x^2 + 4x + 3$:
1) define the function domain;
2) find the points of intersection with coordinate axes;
3) find the parabola vertex coordinates;
4) construct the function graph;
5) determine the function constant sign intervals;
6) define the monotonicity intervals;
7) define the critical points of the function;
8) find the function largest and least values;

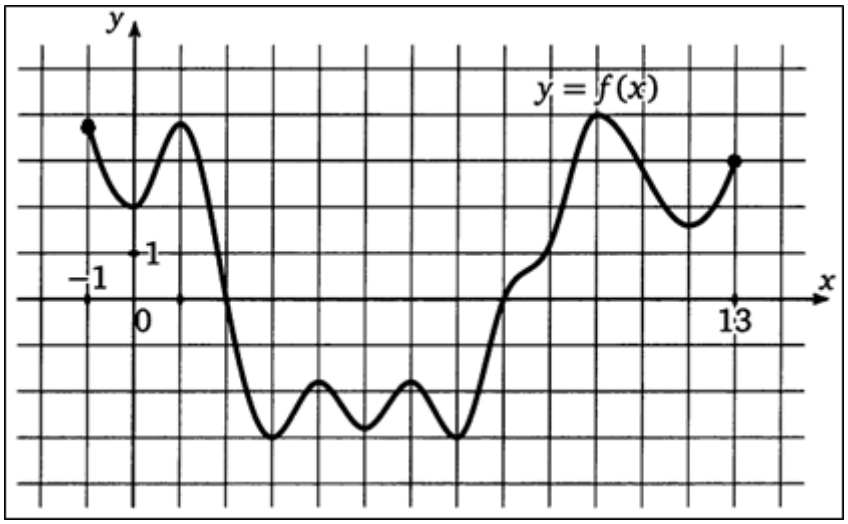

Fig. 39. Function graph for task 1

9) define the function range;
10) define the boundedness of the function;
11) define the function convexity.

Variant 8

1. From the graph of the function $= f(x)$ (Fig. 40) determine the following:
1) the function domain;
2) the function range;
3) zero of the function;
4) function constant sign intervals;
5) function critical points;
6) monotonicity interval;
7) function largest and least values.

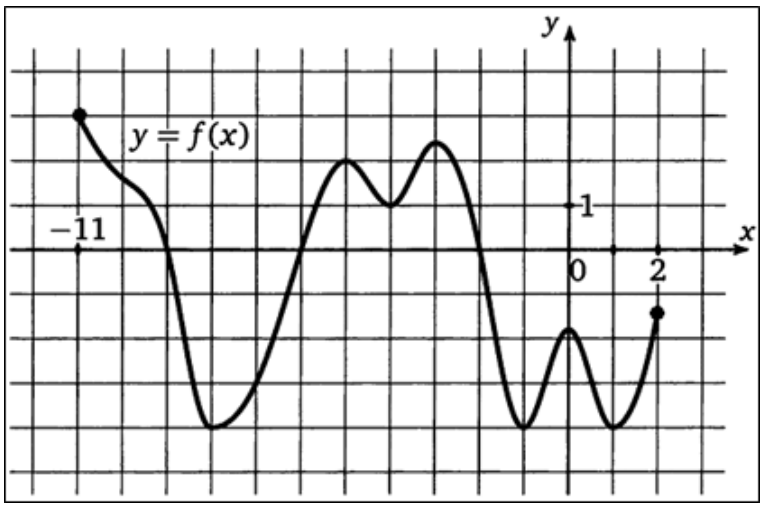

Fig. 40. Function graph for task 1

2. Study the function $y = x^2 + 2x - 3$:
1) define the function domain;

2) find the points of intersection with coordinate axes;
3) find the parabola vertex coordinates;
4) construct the function graph;
5) determine the function constant sign intervals;
6) define the monotonicity intervals;
7) define the critical points of the function;
8) find the function largest and least values;
9) define the function range;
10) define the boundedness of the function;
11) define the function convexity.

Conclusions

The materials of these credit tests will be useful for teachers, students, methodologists studying different programs and textbooks. They may be applied to organize subject and general control, final review and to prepare for the Unified State Exam in Mathematics to enter higher educational Institutions.

References

1. Balayan E. N. Trenirovochnye uprazhneniya po matematike dlya podgotovki k GIA i EGE: 5-11 klassy [Practice exercises in Mathematics to prepare for State Final Examination and Unified State Exam: 5-11 grades]. Rostov-na-Donu. Feniks. 2011. 350 p.

2. Balayan E. N. Kompleksnye uprazhneniya po matematike dlya podgotovke k EGE i olimpiadam (s resheniyami): 7-11 klassy [Complex exercises in Mathematics to prepare for the Unified State Exam and competitions (with solutions): 7-11 grades]. Rostov-na-Donu. Feniks. 2010. 219 p.

3. Glazkov Yu. A. Mathematics. Matematika. Reshenie zadach gruppy V [Solution of group V problems]. Mathematics. Ekzamen. 2009. 382 p.

4. Denishcheva L. O. EGE po matematike 11 klass: uchebnoe posobie [Unified State Exam in Mathematics in the 11-th grade: study guide]. Moscow. BINOM. Laboratoriya znaniy. 2011. 168 p.

5. Semenov A. L., Yashchenko I. V. EGE: 3000 zadach s otvetami po matematike. Zadaniya gruppy V [Unified State Exam: 3000 problems with answers in Mathematics. Group V problems]. Moscow. Ekzamen. 2012. 543 p.

6. Edinyy gosudarstvennyy ekzamen 2011. Matematika. Universal'nye materialy dlya podgotovki uchashchikhsya. FIPI [Unified State Exam 2011. Mathematics. Materials for students. FIPI]. Moscow. Intellekt-Tsentr. 2011. 144 p.

7. Lysenko F. F., Kulabukhova S. Yu. Matematika. Bazovyy uroven' EGE-2013 (V1–V6). [Mathematics. Basic level of the Unified State Exam-2013 (B1–B6). Posobie dlya chaynikov [Guide for dummies]. Rostov-na-Donu. Legion. 2012. 176 p.

8. Lysenko F. F., Kulabukhova S. Yu. Matematika. Bazovyy uroven' EGE-2013 (B7 – B14) [Mathematics. Basic level of the Unified State Exam-2013 (B7–B14). Posobie dlya chaynikov [Guide for dummies]. Rostov-na-Donu. Legion. 2012. 208 p.

9. Lysenko F. F., Kulabukhova S. Yu. Matematika. Podgotovka k EGE-2013. Uchebno-trenirovochnye testy [Mathematics. Preparation for the Unified State Exam-2013. Training tests]. Uchebno-metodicheskoe posobie [Study guide]. Rostov-na-Donu. Legion. 2013. 144 p.

10. Lysenko F. F., Kulabukhova S. Yu. Matematika. Reshebnik. Podgotovka k EGE-2013. Uchebno-trenirovochnye testy [Mathematics. Answer book. Preparation for the Unified State Exam-2013. Training tests]. Uchebno-metodicheskoe posobie [Study guide]. Rostov-na-Donu. Legion. 2013. 192 p.

11. Kochagin V. V., Kochagina M. N. EGE 2010. Matematika: Sbornik zadaniy [Unified State Exam 2010. Mathematics: task book]. Moscow. Eksmo. 2009. 208 p.

12. Lyashko M. A. Lyashko S. A., Muravina O. V. Matematika [Mathematics]. Uchebnoe posobie [Study guide]. Moscow. Drofa. 2011. 151 p.

13. Vlasova A. P., Latanova N. I., Evseeva N. V., Khromova G. N. Matematika: tema «Algebra»: testovye zadaniya bazovogo i vysokogo urovnya slozhnosti: V1, V5, V7, V12 [Mathematics: subject «Algebra»: tests of basic and high levels of complexity: V1, V5, V7, V12. Moscow. Astrel'. 2011. 31 p.

14. Panferov V. S., Sergeev I. N. Otlichnik EGE. Matematika. Reshenie slozhnykh zadach. FIPI [Honors of the Unified State Exam. Mathematics. Solution of complicated problems. FIPI]. Moscow. Intellekt-Tsentr. 2010. 80 p.

15. Positsel'skaya M. A., Positsel'skiy S. E. EGE 2014. Matematika. Zadacha V2. Grafiki i diagrammy. Rabochaya tetrad' [Unified State Exam 2014. Mathematics. Problem V2. Graphs and diagrams. Activity book]. Moscow. MTsNMO. 2014. 56 p.

16. Smirnova I. M., Smirnov V. A. Geometriya. Posobie dlya podgotovki k EGE: uchebnoe posobie [Geometry. Guide for preparation for the Unified State Exam: study guide]. Moscow. Ekzamen. 2008. 158 p.

17. Titarenko A. M. Matematika: 9-11 klassa: 6000 zadach i primerov [Mathematics: 9-11 grades: 6000 problems and examples]. Moscow. Eksmo. 2007. 336 p.

18. Chelombit'ko V. P. Matematika: ves' kurs: teoriya, zadachi, resheniya: dlya vypusknikov i abiturientov [Mathematics: whole course: theory, problems, solutions: for high school graduates]. Moscow. Eksmo. 2010. 448 p.

19. Yashchenko I. V., Shestakov S. A., Trepalin A. S., Zakharov P. I. Podgotovka k EGE po matematike v 2012 godu. Metodicheskie ukazaniya [Preparation for the Unified State Exam in Mathematics in 2012. Methodological instructions]. Moscow. MTsNMO. 2012. 208 p.

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