**Problem 1** **1 Point**

Find the domain of the function $y = \sqrt{|x|}$ .

a) $[0; +\infty)$ b) $(-\infty; +\infty)$ c) $(-\infty; 0)$ d) $\varnothing$

**Problem 2** **1 Point**

Suppose $y = \sqrt{x}$, $x > 0$. By how many percent will increase $y$ if $x$ increases 21%?

a) $\sqrt{21}\%$ b) 11% c) 1,1% d) 10%

**Problem 3** **1 Point**

Find $f'(1)$, if the function $f$ is defined by formula $f(x) = \sqrt{x}e^{2x}$.

a) $\frac{5}{2}e^2$ ;
b) $e^2$;
c) $e$;
d) $\frac{1}{2}e^2$.

**Problem 4** **2 Points**

Find the median of the data: $-1;\ 5;\ x;\ 10;\ 9;\ 6$, if the mean of this data is $6$.

a) $6$ b) $6,5$ c) $7$ d) $7,5$

**Problem 5** **2 Points**

A point $M$ is randomly selected from a segment $AB$ whose length is 9. What is the probability that the longest segment between $AM$ and $MB$ has the length no more then 6?

a) $\frac{1}{2}$ b) $\frac{1}{3}$ c) $\frac{2}{3}$ d) $1$

**Problem 6** **2 Points**

Suppose that the graph of $f(x)=-x^2+1$ is translated by $5$ units right and by $3$ unit up. If the resulting graph represents the function $g(x)$, find the roots of the equation $g(x)=0$.

a) $\{7;3\}$ b) $\{1;-1\}$ c) $\{6;4\}$ d) $\{4;3\}$

**Problem 7** **2 Points**

Find the range of the function $f(x)=x^2-2x+1$ if $x\in[-1;\,2)$.

a) $(0;\,4]$ b) $(1;\,4]$ c) $[1;\,4)$ d) $[0;\,4]$

**Problem 8** **1 Point**

Find $x$, if the tangent line of the graph of the function $f(x)=x^2-6x+1$ at the point $(x,f(x))$ is parallel to the line $y=2x$.

a) $4$
b) $4-\sqrt{15}$
c) $4+\sqrt{15}$
d) $-2$

**Problem 9** **2 Points**

Which of the following numbers cannot be a root of the polynomial function $P(x)=16x^7+ax^3+b$, where $a$ and $b$ are integers?

a) $4$
b) $16$
c) $\frac{1}{7}$
d) $\frac{1}{2}$

**Problem 10** **2 Points**

The rational function $R(x)=\dfrac{2x^2-32}{x^2-x-12}$ has a

a) vertical asymptotes at $x=-3$ and $x=4$ and horizontal asymptote $y=2$;
b) vertical asymptote at $x=-3$ and no horizontal asymptote;
c) vertical asymptotes at $x=-3$ and $x=4$ and no horizontal asymptote;
d) vertical asymptote at $x=-3$ and horizontal asymptote $y=2$.

**Problem 11** **2 Points**

$\lim\limits_{x\to 1}\dfrac{1-x^2}{x^4-x}=$

a) $\dfrac{2}{3}$ b) $-\dfrac{2}{3}$ c) 1 d) $-2$

**Problem 12** **Point 1**

Find the inverse of the matrix $\begin{pmatrix}4 & 3\\ 3 & 2\end{pmatrix}$.

a) $\begin{pmatrix}3 & 2\\ 4 & 3\end{pmatrix}$ b) $\begin{pmatrix}-2 & 3\\ 3 & -4\end{pmatrix}$ c) $\begin{pmatrix}\frac{1}{4} & \frac{1}{3}\\ \frac{1}{3} & \frac{1}{2}\end{pmatrix}$ d) $\begin{pmatrix}\frac{1}{4} & 0\\ 0 & \frac{1}{2}\end{pmatrix}$

**Problem 13** **2 Points**

Find $k$ if it is known that the remainder of the division of the polynomial $x^3+(k+2)x^2+2x-3$ by linear polynomial $x-3$ equals to $3$.

a) $-3$ ;
b) $-\frac{48}{9}$ ;
c) $-5$ ;
d) $3$.

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**Problem 14** **2 Points**

Find the domain of the function $f^{-1}$ if $f(x)=\sqrt{x-2}$ .

a) $[2;+\infty)$ b) $(-\infty;2]$ c) $[0;+\infty)$ d) $(-\infty;+\infty)$

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**Problem 15** **2 Points**

Find extremum point of $f(x)=\frac{e^{2x}}{x}$, $x>0$ .

a) $0.5$ b) $\frac{3}{2}$ c) $0.25$ d) $1$

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**Problem 16** **3 Points**

If the graph of functions $f: R \to R$ is symmetric to the graph of the function $g: R \to R$ with respect to the origin $O$ of the Cartesian coordinate system $Oxy$, then for any real $x$

a) $g(x) = -f(x)$ b) $g(x) = f(-x)$ c) $g(x) = f(x)$ d) $g(x) = -f(-x)$

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**Problem 17** **3 Points**

Find the absolute maximum and absolute minimum of the function $f(x) = 3x^2 - x^3$ on $[0; +\infty)$

a) $f_{abs\max} = 4$ ; $f_{abs\min} = 0$;
b) $f_{abs\max} = 2$ ; $f_{abs\min} = 0$;
c) $f_{abs\max} = 4$ ; $f_{abs\min}$ doesn't exist;
d) $f_{abs\max}$ doesn't exist ; $f_{abs\min}$ doesn't exist .

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**Problem 18** **3 Points**

The tangent line to the graph of the function $y = x^2 + px + q$ at the point $x = 1$ is defined by the equation $y = 3x - 2$. Find the equation of the tangent line to the graph of the same function at the point $x = 2$.

a) $y = 2x - 3$ b) $y = 5x + 7$ c) $y = 2x - 1$ d) $y = 5x - 5$

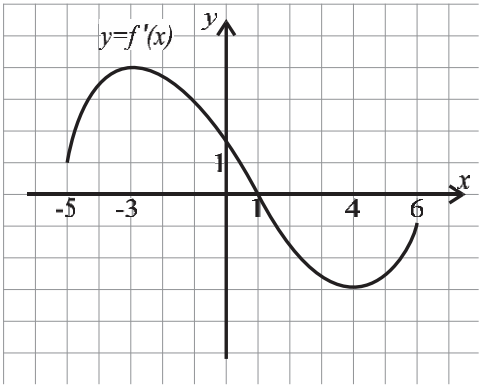
**Problem 19** **3 Points**

Find the inflection point(s) of the function $f(x)=\ln(x^2-4x+5)$.

a) $\{1;\ 3\}$ b) 2 c) $e$ d) $\varnothing$

**Problem 20** **3 Points**

On the picture is represented the graph of the **derivative** of a function $y=f(x)$ defined on the interval $(-5;6)$. Which of the following statements is true?




a) $x=-3$ and $x=4$ are correspondingly the global maxima and the global minima points for $f$;
b) $x=1$ is the local maxima point but not global maxima point for $f$;
c) $x=1$ is the global maxima point;
d) $f$ is concave on the interval $(-5;1)$ and convex on the interval $(1;6)$.