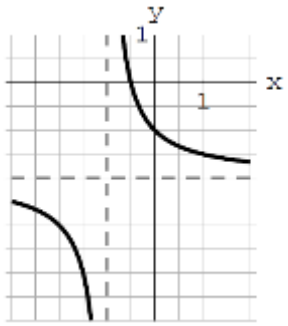
Protocol

	a	b	c	d	e
1.	☐	☐	☐	☐	☐
2.	☐	☐	☐	☐	☐
3.	☐	☐	☐	☐	☐
4.	☐	☐	☐	☐	☐
5.	☐	☐	☐	☐	☐
6.	☐	☐	☐	☐	☐
7.	☐	☐	☐	☐	☐
8.	☐	☐	☐	☐	☐
9.	☐	☐	☐	☐	☐
10.	☐	☐	☐	☐	☐
11.	☐	☐	☐	☐	☐
12.	☐	☐	☐	☐	☐
13.	☐	☐	☐	☐	☐
14.	☐	☐	☐	☐	☐
15.	☐	☐	☐	☐	☐
16.	☐	☐	☐	☐	☐
17.	☐	☐	☐	☐	☐
18.	☐	☐	☐	☐	☐
19.	☐	☐	☐	☐	☐
20.	☐	☐	☐	☐	☐

1. The graph of the function $y = \sqrt{4x^2 - 1}$ lies on a
   a) straight line
   b) parabola
   c) hyperbola
   d) ellipse
   e) circle

2. The following picture shows the graph of the function



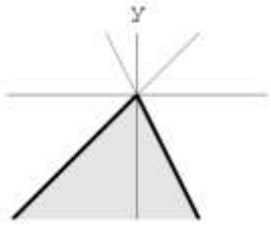
   a) $y = -\frac{1}{x+1} - 2$
   b) $y = \frac{-2x-1}{x+1}$
   c) none of the functions indicated here
   d) $y = \sqrt{4 + x^2}$
   e) $y = (x + 1)^2 - 2$

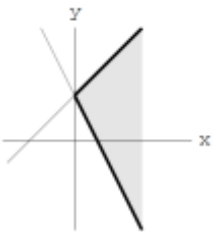
3. Choose one figure from the series 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, denote it as "x" and form a five-digit number $n = 32x1x$. All the figures x, for which the number n is divisible by fifteen, are
   a) 0, 5
   b) 0
   c) 5
   d) 0, 3, 5
   e) 3, 5, 8

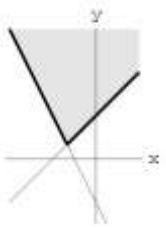
4. In R, the equation $3 + \sqrt{x + 7} = x - 2$ contains:
   a) one positive and one negative root
   b) a single negative root
   c) two positive roots
   d) a single positive root
   e) no root

5. The value of the expression $2 \cdot \log_{\frac{1}{4}} 2 + \log_{\frac{1}{4}} 3 - \log_{\frac{1}{4}} 15 + \log_{\frac{1}{4}} 40$ is
   a) greater than 0 and less than 1
   b) greater than 2
   c) 2
   d) greater than 1 and less than 2
   e) less than 0

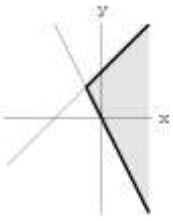
6. Which cross-hatched area represents a set of points that simultaneously meet the following two conditions: $y + 2x \geq 0$, $y \leq 1 + x$?

a) 

b) 

c) 

d) 

e) 

7. The set of all real numbers that meet the inequation $\frac{3+2\log x}{3} \leq 5$ is
   a) $(-\infty; 6\rangle$
   b) $(0; 6\rangle$
   c) $(-\infty; 2^6\rangle$
   d) $\langle 6; +\infty)$
   e) $(0; 10^6\rangle$

8. There is a sequence $(2n^2 - 3n)_{n=1}^{\infty}$. Out of the series 10, 35, 90, the sequence includes the following terms:
   a) 10 and 35
   b) 10 and 90
   c) just 10
   d) just 90
   e) just 35

9. For all real numbers a, b, where $a \neq b$, $a \neq -b$, $b \neq 0$ applies, the expression $\left(\frac{a+b}{a-b} - \frac{a-b}{a+b}\right).\left(1 - \frac{a}{b}\right)$ equals the expression
   a) $-\frac{4a}{a+b}$
   b) $\frac{b-a}{b}$
   c) $-\frac{2b}{a+b}$
   d) $\frac{2b}{a+b}$
   e) $\frac{4a}{a+b}$

10. The number of solutions of the equation $\sin x + \cos 2x = 0$ over the interval $\langle \pi; 2\pi \rangle$ is
    a) 1
    b) 4
    c) 3
    d) 5
    e) 2

11. The set of all real numbers that fulfil the inequation $x + 1 < |x|$ is
    a) R
    b) $\left(-\infty; -\frac{1}{2}\right)$
    c) $\left(-\frac{1}{2}; 0\right\rangle$
    d) $\emptyset$
    e) $(-\infty; 0)$

12. Points $A = [-1; 0]$; $B = [6; -3]$; $C = [2; 5]$ are given in a plane. The height of the triangle ABC from the apex A to the side BC fulfils the equation
    a) $2x - y + 2 = 0$
    b) $x - 2y - 1 = 0$
    c) $2x - y - 2 = 0$
    d) $x + 2y + 1 = 0$
    e) $x - 2y + 1 = 0$

13. The geometric progression quotient is 2, and $a_n = \frac{16}{3}$, $s_n = \frac{21}{2}$. The number of terms n is
    a) 9
    b) 8
    c) 6
    d) no such geometric progression exists
    e) 12

14. Goods, the initial price of which was CZK 1200, were discounted twice, first by 15%, then by 10% of the new price. What is the percentage by which the goods were discounted in total?
    a) 30%
    b) 5%
    c) 25%
    d) 12.5%
    e) 23.5%

15. Within natural numbers, the equation $\binom{n-1}{n-3} + \binom{n-2}{n-4} = 9$ has
    a) exactly two roots
    b) only one root, $n = 1$
    c) only one root, $n = 5$
    d) no root
    e) exactly three roots

16. The domain of the function $y = \sqrt{(1 - x)(x + 3)}$ is
    a) $(-\infty; 1\rangle$
    b) $\emptyset$
    c) $\langle -3; 1\rangle$
    d) $(1; +\infty\rangle$
    e) $(-\infty; 1\rangle \cup \langle 3; +\infty)$

17. For all admissible sizes of the angle x, the expression $\frac{\sin x - \sin^3 x}{\cos x - \cos^3 x}$ equals the expression
    a) $-\frac{\cos x}{\sin x}$
    b) $\operatorname{tg} x(1 - \operatorname{tg}^2 x)$
    c) $\operatorname{cotg} x$
    d) $\operatorname{tg} x$
    e) 1

18. In the arithmetic progression whose difference equals 4, the following holds: $s_{10} > 100$. The other term of such a progression must fulfil the condition
    a) $a_2 > -4$
    b) $a_2 > 0$
    c) $a_2 > -8$
    d) $a_2 > -13$
    e) a_2 is any real number

19. Three statements are given about a student, Václav:
    1. If he wins a great deal of money in the lottery, he will not work.
    2. If he does not win a great deal of money in the lottery, he will work.
    3. If he works, he will not win a great deal of money in the lottery.

    Which of the above statements are equivalent?

    a) only 1 and 2
    b) only 1 and 3
    c) 1 and 2 and 3
    d) only 2 and 3
    e) no two of them are equivalent

20. Within R, the equation $2^{x^2 - 5x + 6} = 1$ has
    a) two roots whose product is 5
    b) no root
    c) two roots whose product is 6
    d) only one positive root
    e) only one negative root

Correct answers:

1. c
2. b
3. b
4. d
5. e
6. e
7. e
8. e
9. a
10. e
11. b
12. e
13. c
14. e
15. c
16. c
17. c
18. a
19. b
20. c