1. The probability of the symptom A is 25% and the probability of the symptom B (which occurs independently on the symptom A) is 60%. What is the probability that both symptoms are observed in a patient?
   a) less than 25% +
   b) between 50% and 75% -
   c) between 25% and 50% -
   d) more than 75% -

2. A sphere has been enlarged, such that its surface area increased by a factor of 3. Its volume increased by a factor of
   a) 5.2 +
   b) 3 -
   c) 9 -
   d) 1.7 -

3. A curve is described by the equation \( x^2 + y^2 + 2x + 4y + 1 = 0 \). What is it?
   a) a circle +
   b) a parabola -
   c) an ellipse -
   d) a hyperbola -

4. The function \( f(x) = x \cos(x) \) is:
   a) odd +
   b) neither even, nor odd, nor monotonic -
   c) monotonic -
   d) even -

5. What is the distance between points A=[-5,0,3] and B=[0,5,0]?
   a) 7.7 +
   b) 5.3 -
   c) 12.6 -
   d) 3.5 -

6. How many solutions of the equation \( 3x^2 + 5 \) are there in domain \( \mathbb{R} \)?
   a) none +
   b) 2 -
   c) 4 -
   d) 1 -

7. Find the center \( C \) of a circle given by the equation \( x^2 + y^2 -8x + 6y + 9 = 0 \).
   a) \( C = [4; -3] \) +
   b) \( C = [-3; 2] \) -
   c) \( C = [2; -4] \) -
   d) \( C = [1; 1] \) -

8. Choose the correct statement for the function \( f(x) = (x - 3)(x + 2) \) on the interval \([-5, 2]\)
   a) \( f(x) \) has minimum value at \( x = 0.5 \) +
   b) \( f(x) \) has maximum value at \( x = 0 \) -
c) $f(x)$ has minimum value at $x = -5$ -
d) $f(x)$ has maximum value at $x = 2$ -

9. What is the domain of function $f(x) = \log_2 \left( \frac{5}{|x-5|} \right)$?
   a) all real numbers except 5 +
   b) all positive real numbers except 5 -
   c) all positive real numbers -
   d) all real numbers -

10. What is the range of function (the set of all value of the function) $f(x) = 4 \cos \left( \frac{x}{4} \right)$?
   a) $(-4; 4)$ +
   b) $\left( -\frac{1}{4}; \frac{1}{4} \right)$ -
   c) $(-1; 1)$ -
   d) $(-\infty; \infty)$ -

11. How many combinations of 5 different alphanumeric characters (repetition is not allowed) are there? Alphanumeric is a combination of alphabetic (26, case insensitive) and numeric characters.
   a) 376,992 +
   b) approx. 60.5 millions -
   c) approx. 45.2 millions -
   d) 658,008 -

12. What is the sum of the 1st and 6th term of an arithmetical sequence if the sum of first 6 terms of this arithmetical sequence is 30?
   a) 10 +
   b) 12 -
   c) 6 -
   d) 5 -

13. There are 6 black and 4 white balls in a bowl. What is the probability $P$ that at least one of two randomly picked balls is white?
   a) 50% ≤ $P$ < 100% +
   b) 100%, at least one of picked balls must be white -
   c) 0% < $P$ < 50% -
   d) 0%, both balls must be black -

14. What is the 1st term of a geometric sequence if the 3rd term is 5 and 5th term is 25?
   a) 1 +
   b) −15 -
   c) −5 -
   d) $\sqrt{5}$ -
15. Simplify the expression: \( \frac{a^{-3}b^3}{\sqrt{a^{-4}b^6}} \log_a a^4 \)

a) \( \frac{4}{a} \) +  

b) \( \frac{b}{a} - 4 \) -  

c) \( a b^{-3} \) -  

d) \( a + 4 + b \) -  

16. Choose the smallest integer constant \( b \) so that the quadratic equation \( 3x^2 + bx + 1 = 0 \) has two real solutions:

a) 4 +  

b) 1 -  

c) 2 -  

d) 3 -  

17. What is the solution of the inequality \( \frac{2|x - 3|}{3} > 4 \)

a) \( (-\infty, -3) \cup (9, \infty) \) +  

b) \( (-\infty, -3) \cup (3, \infty) \) -  

c) All real numbers except -3 a 3 -  

d) \(-3, 3\) -  

18. What is the length of leg (cathetus) of an isosceles right-angled triangle (i.e. both legs - catheti - are equal) whose area is 25?

a) \( 5\sqrt{2} \) +  

b) \( 2\sqrt{5} \) -  

c) 10 -  

d) \( \sqrt{10} \) -  

19. Which of the following vectors is perpendicular to the vector \( u = (2, 3) \)

a) (-3, 2) +  

b) (2, 0) -  

c) (3, 0) -  

d) (3, 2) -  

20. If \( \pi < \alpha < 2\pi \) and \( \sin(\alpha) = -0.37 \) what is the value of \( \sin(\alpha - \pi) \)?

a) 0.37 +  

b) \( \cos \alpha \) -  

c) \( -\cos \alpha \) -  

d) -0.37 - 

21. The original statue is 1.5 m high. An enlarged copy of that statue is 3 m high. What is the ratio of the volume of the original statue to the volume of its enlarged copy?
a) 1:8 +  
b) 1:4 -  
c) 1:2 -  
d) 2:3 -  

22. Volume of a cone is given by the formula:
   a) \( \frac{1}{3} \pi h r^2 + \)  
b) \( \pi h r^2 - \)  
c) \( \pi h r - \)  
d) \( \frac{1}{2} h r^2 - \)  

23. Let \( C \) be a circle circumscribing a square \( S \). Then the area ratio \( C/S \) of the circumscribed circle \( C \) and the square \( S \) is:
   a) \( \frac{\pi}{2} + \)  
b) \( \frac{3}{2} - \)  
c) \( \frac{\sqrt{2}}{2} - \)  
d) \( \pi - \)  

24. What is the total surface area of a sphere if its volume is \( 10\pi \)?
   a) \( 15.3\pi + \)  
b) \( 12 - \)  
c) \( 2.5/\pi - \)  
d) \( 10/\pi - \)  

25. Let \( i \) is the imaginary unit defined as \( i^2 = -1 \). Simplify the expression of \(-1 + i^1\)
   a) \(-1 - i + \)  
b) \(0 - \)  
c) \(-1 - \)  
d) \(-1 + i - \)  

26. What is the volume of the cylinder with a radius of 3 and a height of 7?
   a) \( 63\pi + \)  
b) \( 21 - \)  
c) \( 441 - \)  
d) \( 42\pi - \)  

27. What is the sum of all even numbers from 20 to 100?
   a) \( 2460 + \)  
b) \( 4000 - \)  
c) \( 2400 - \)  
d) \( 4800 - \)  

28. What is the solution of the inequality \( \log_{10}(1 - 4 x) \geq 0 \)?
   a) \( (-\infty; 0) + \)  
b) \( (-1;4] - \)
c) \((-\infty; \infty)\) -

d) \(\left(0; \frac{1}{4}\right)\) -

29. Each interior angle in a regular hexagon is

a) 120° +
b) 60° -
c) 108° -
d) 136° -

30. What is the smallest period of the function \(f(x) = 2\sin(3x)\)?

a) \(\frac{2\pi}{3}\) +
b) \(\frac{3\pi}{2}\) -
c) \(\pi\) -
d) \(\frac{3}{2}\) -