

## EXAMPLE of TASKS for WRITTEN TEST 1

### PART 1

**TASK 1.** Solve the systems using Jordan-Gauss method and check its solution using a substitution. Define rankA, rankA|B and n. What is a type of this system?

$$\begin{cases} x_1 + 2x_2 + x_3 = -1 \\ 3x_1 - x_2 - x_3 = -1 \\ -2x_1 + 2x_2 + 3x_3 = 5 \end{cases} .$$

### PART 2

1) Calculate the determinant:

$$A = \begin{pmatrix} 2 & 3 & 3 \\ 1 & 0 & -2 \\ -1 & -4 & 1 \end{pmatrix}$$

2) Finding Equilibrium point using Linear Demand and Supply Equations:  $Q_d = 100 - 3p$  and  $Q_s = 2p + 20$  (<https://www.youtube.com/watch?v=vUyRQ066tw0>)

3) Determine the general equation of the straight line through two points  $A(-2;4)$  and  $B(1;3)$

4) Calculate the distance from point to  $M(1;-2)$  to the straight line  $3x+4y-10=0$

5) Calculate the limit:  $\lim_{x \rightarrow 1} \frac{x^2 - 1}{3x^2 - 2x - 1}$

6) Find the derivative of functions:

(a)  $y = 3\arcsin x - 4\sqrt{x}$ .

(b)  $y = \frac{x^2 + 2x}{3 - 4x}$ .

(c)  $y = \sin x \cdot \arccos x$

7) Define Z'y or Z'x of this function:

$$z(x, y) = 500x + 600y - x^2 - 2xy - 2y^2$$

8) The area of the plane figure bounded by functions:

$y = x^2 + 4x, x - y + 4 = 0.$	Answer: $\frac{125}{6}$ .
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9) Calculate the length of vector AB if  $A(2,-1,1)$  and  $B(4,1,0)$

10) Calculate the scalar product of vectors  $\vec{a} = (-3;4;-1)$  and  $\vec{b} = (-1;2;3)$ .

11) Calculate indefinite integrals:

$$\int 4x^7 dx \quad \int 6^{2x+9} dx$$

12) There are 2400 pupils at Transum School. 49% of them say that they like Marmite. How many do not like Marmite?