1. Take the integral of the expression. $(x) = \sin(x) - x^3 + \cos(5 * x)$

2. Find the roots of the expression. $x^8 - 5 * x^7 + 4 * x^5 - 2 * x^3 - x + 5 = 0$

3. Find the x, y, z, and t values by solving the sets of equations.

$x^2 - y + 5 * t^3 = -1$; $y^2 + z^2 - t = 3$; $8 * x - 4 * y^2 = 6$; $2 * z + 5 * t = 2$

4. Calculate the value of k and y using equations below from 0 to 20 with 0.1 increments. Plot the graph of t versus k and y.

$$k = 1 - e^{5\cdot 10^{-2}\cdot t}\cdot\cos(t) + 5\cdot 10^{-2}\cdot e^{5\cdot 10^{-2}\cdot t}\cdot\sin(t) \qquad y = e^{-k} - \sin(k)$$

5. Propose a third-order polynomial model equation to the experimental data given below. Compare the proposed model equation solution with the experimental data by showing them on the same graph. Find the correlation coefficient.

x	2	4	6	8	10	12	14	16	18
y	11	23	32	39	44	40	29	20	9

6. Propose a model for the experimental data given below in the form of $\boldsymbol{Y = a \cdot (x) + b}$. Show the proposed model solution and the experimental data on the same graph. Find the correlation coefficient.

x	2	15	45	75	105	135	165	195	225	255
Y	0	-6.15	-8.5	-9.7	-10.41	-10.96	-11.65	-12.54	-12.1	-12.16

7. The variation of vapor pressure of acetic acid with temperature is given below. Find the vapor pressures at 283, 293, 303, 313 and 323 K.

T	274.7	297.8	309	321.3	335.1	343.8
Ps	0	-6.15	-8.5	-9.7	-10.41	-10.96

8. Solve the following mathematical expression for x(0)=4; x'(0)=-1 and x''(0)=0 and plot the graph.

$$\frac{d^3x}{dt^3} + 0.2 * \frac{d^2x}{dt^2} + 10 * \frac{dx}{dt} + 3 = \sin(3 * t)$$

9. Write a program to solve function given below, with the x and y value proposed by the user. And, based on the result, show “imaginary result” response for the case of the result of the function is imaginary and “no result” response for the case of unresolved.

$$F(x,y) = x \cdot y + x^2 \cdot y + x \cdot y^3 + \frac{\ln(x)+1}{log_{10}(y)} + \sqrt{x \cdot y} + \frac{3 \cdot x + y}{y^4}$$

10. Write a program to calculate the arithmetic, geometric and harmonic mean of any three numbers entered by the user. Tips:

Arithmetic = $(a + b + c)/3$

Geometric = $\sqrt[3]{a * b * c}$

Harmonic =3* $\left(\frac{1}{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}} \right)$