Name of Course	: **CBCS B.A. (Prog.)**
Unique Paper Code	: **62353327_LOCF**
Name of Paper	: **SEC-Computer Algebra System**
Semester	: **III**
Duration	: **2 hours**
Maximum Marks	: **38 Marks**

Attempt any four questions. All questions carry equal marks.
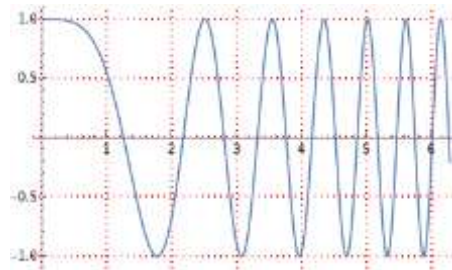
Q1. Form the following grid using appropriate functions

1	1	1	1
2	4	8	16
3	9	27	81
4	16	64	256
5	25	125	625

Each column is right aligned.

Graph each of the functions

    a.   g(x, y) = 19cos (x) + sin(√7 x), -20≤x≤20

    b.   2 x + 1, 1 - x², 1 - x - x²/3, -2≤x≤2

Q2.

Create the above plot of f(x)=cos(x²), 0≤x≤2π, with thick, red and dotted grid lines. Change the code so that the grid lines appear only at $x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ and y=.1,.3,.5,.7,.9

Compute each expression.
    a. 3^8 mod 7
    b. 5^{10} mod 11

Q3. Write the command to define a polynomial

$$f(x) = x(x^2 + y^2) - a(x^2 - y^2)$$

Plot it in $-a \le x \le a$. Write a syntax to solve

$$g(x) = 3x^3 - 16x^2 + 23x - 6$$

and find the numerical solution of $g(x) = 0$.

Q4. Give the syntax to find the derivative of $f(x) = \frac{1}{(1+4x^2)\sqrt{1+3x^2}}$ with respect to x, then evaluate

$$\int_0^\infty \frac{1}{(1+4x^2)\sqrt{1+3x^2}}\,dx$$

and write a command to compute:

$$\sum_{p=0}^{100}(p+2)^5$$

Q5. Find the minimum value of the function $f(x) = x^{2/3}$ and write syntax for it also. Find the extreme point of the function $g(t) = 9t^2 + 2t + 4$ and also plot the given function.

Q6. Generate a 9×9 matrix whose i, j th entry is i^2+2ij by using Table command. Also write syntax to get the fifth column of the matrix. Find the trace of the matrix.