Numerical Analysis and Probability questions bank (Theory and Practical)

1- The report said the car park held 240 cars, but we counted only 200 parking spaces, what is the report percentage error.

2- Write the rules for finding the significant figures for numbers with a decimal point.

3- Find the significant digits (significant number or significant figure) of the following numbers 0.0090 and 09980).

4- How many significant digits are in 0.0706020?

5- Round 32.34 to 2 significant digits.

6- Find with the correct significant figures Y = 232.234 + 0.27

7- Find with the correct significant figures Y = 232.234 / 0.27

8- Suppose you want to measure the ratio of the length of item *a* to item *b*. You measure the length of *a* to be 20 inches ± 0.34 inches and the length of *b* to be 15 inches ± 0.21 inches.

9- if s = 2 inches ± 0.02 inches. calculate $v = s^3$.

10- Use Descartes' Rule of Signs to determine the number of real zeroes of:

$f(x) = x^4 - 3x^3 + x^2 - x + 1$

11- Solve this equation using Newton Raphson $f(x)=x^3-2x-1$; Where; Accuracy=0.001, consider 4 decimal places (4 digits after the decimal point) in the calculations.

12- Solve the equation f(x)=x^3 -2x-1 using Steffensen's method; Where; Accuracy=0.001, consider 4 decimal places (4 digits after the decimal point) in the calculations.

13- Use Budan's theorem to find the interval roots of the function: f(x)=x^3 +x^2 -1

14- Solve graphically the following system of equations. 2x−y+1=0; y=2x+1

15- Determine the value of k for which the given system of equations has infinitely many solutions.

(k+5)x−12y= -24 −3x+ky=8

16- Solve this system of equations using Gauss-Jacobi method 3x+y=11 2x+3y=16

17- Solve this system of equations using Gauss-Seidel method 3x+y=11 2x+3y=16

18- Find a root of an equation f(x)=x^3 -x-5 using Bisection method, accuracy=0.001; and find the absolute relative approximate error at the end of each iteration.

19- Interpolate 3 using the following points

x	y
1	0
4	2.3
5	2.91

20- Find the equation of a straight line or a least square line using the least square method. And find the sum of squares of deviations from the obtained values.

x_i	8	3	2	10	11	3	6	5	6	8
y_i	4	12	1	12	9	4	9	6	1	14

21- Approximate the area under the curve y = f(x) between x =-4 and x= 2 using Trapezoidal Rule with n = 6 subintervals. A function f(x) is given in the table of values.

x	-4	-3	-2	-1	0	1	2
f(x)	0	4	5	3	10	11	2

22- Approximate the area under the curve y = f(x) between x =-2 and x= 2 using Trapezoidal Rule with n = 4 subintervals. A function f(x) is given in the table of values.

-2	-1	0	1	2
5	3	10	11	2

23- A function f(x) is given by the table of values. Approximate the area under the curve y=f(x) between x=0 and x=4 using Simpson's Rule with n=4 subintervals.

x	0	1	2	3	4
$f(x)$	2	7	12	10	5

24- Given the following values of f(x), find the approximate value f `(2.2), f ``(2.2), using linear and quadratic interpolation.

2	**2.2**	**2.6**
0.69	**0.79**	**0.96**

25- Use Buddan theorem to find real zeroes interval of: $f(x) = x^5 - x^4 + 3x^3 + 9x^2 - x + 5$

Practical

26---------- MATLAB command used to clear all used variables.

27---------- MATLAB command used to find roots of a polynomial.

28---------- MATLAB command used to polynomial at point x.

29---------- MATLAB command used to find a polynomial coefficients as a vector.

30--------- MATLAB command used to find square root a given parameter number.

31--------- MATLAB command used to plot a given parameter function with a given interval.

32--------- MATLAB command used to clear a MATLAB command window.

33-Write a MATLAB function to return sqrt of a number.

34-Write a MATLAB function to return factorial of a specified number.

35-plot the following polynomials, according to x=1:1:10

$y=x^3+3x-10$; $z=2x^3+x^2+9$

36-Write a MATLAB function to find root of a non-linear equation using Newton's Raphson method.

37-Write a MATLAB function to find root of a non-linear equation using Bisection method.

38-Write a MATLAB function to find root of a non-linear equation using Steffensenmethod.

39-Write a m function that takes a number and return sqrt of a number

40-Write a function to return sqrt and power 2 of a given parameter number.

41-Write a m function that find and return summation between two given numbers.

42-Write a m function to get a string and a given letter from the user , count and return number of appearance of the given letter in the inputted string.

43- if f(x)=x^3-x-1; find vector of y, when y=x-f(x) from x=1 to 5

44- plot the simple function y = x for the range of values for x from 0 to 100, with an increment of 5.

45- Write a MATLAB function that takes two numbers (m, n), where m is an integer number that should be rounded to n specified significant figures, the function should return the number after rounded it to the specified significant figures.

46- Write a MATLAB function to find summation of two matrices.

47- Write a MATLAB function to find and return transpose of matrix.

48- Write a MATLAB function to find and return multiplication of two matrices.

49- Create a M function that takes a matrix named A, and return an array contains all non zero values of the matrix A.

50- Create a 3 by 3 matrix. Fill it with random values from 0 to 9, using one MATLAB command.