Absolute Error : The absolute error is used to denote the actual value of a quantity less it's rounded value if x and x* are respectively the rounded and actual values of a quantity, then absolute error is defined by AE=|x-x*|

Accuracy : The Extent of the closeness between the actual value and estimated value is known as accuracy. Suppose you have taken readings like 2.1234,2.1236and 2.1238 and 2.45,2.52,2.63 Now if the actual root is 2.65 then the second values are more accurate and not precise but first set of values is precise but not accurate as it differs from the actual value.

Algebraic equation : The equation f(x)=0 is known as algebraic equation if it is purely a polynomial in x. Like f(x)=3 ,f(x)=x3-3x-4 are some examples of algebraic equations and the if variable is changed to y x or any one then under the same conditions it will be algebraic.

Bisection method : It is a bracketing method which is used to locate the root of an equation and it make use of intermediate value property to locate the interval in which the root lies , formula which is used is (a+b)/2 where a and b are points such that f(a)f(b)<0.

Bracketing Method : The iterative methods which require two initial approximation for it's first iteration are known as bracketing methods. Bisection method is the example of the bracketing method as it requires a interval for the approximation of the root.

rout's Method : This method is used to solve the system of the equations by decomposing the system into two matrices L and U where L is a lower triangular matrix and U is an upper triangular matrix. In U all the elements in the main diagonal are 1.

Descartes rule of signs : The no of positive roots of an algebraic equation f(x)=0 with real coefficients cannot exceed the no of changes in the in sign of the coefficients in the polynomial f(x)=0, similarly the no of negative roots of f(x)=0 can not exceed the no of changes in the sign of the coefficients of f(-x)=0

Direct methods : These are the methods which do not need the knowledge of the initial approximation are known as direct methods.

Gauss Elimination Method : It is a direct method which is used to solve a system of equations

Gauss seidel iterative method : It is an iterative method in which an initial approximation is given. First of all system should be checked either it is diagonally dominant or not if it is not then it is made diagonally dominant. Secondly the first variable is calculated in terms of other variables from first equation and Second variable from second equation and so on .the previous value of the variable is replaced by new value instantly as it is obtained. This is the difference in the gauss seidel and jacobie iterative method.

Graeffee's root squaring method : This method is used to find all the roots of the polynomial equation.

Intermediate value property : If for an equation f(x)=0 for two values a and b we have such that f(a)f(b)<0 then there must exist a root between a and b in the interval [a,b].

Inverse of a matrix : The matrix B is said to be inverse of a matrix A if the product of and B is I identity matrix.

Iterative methods : Iterative methods are those type of methods which always require an initial

approximation to start an iteration

Jacobie's iterative method: : It is an iterative method in which an initial approximation is given. First of all system should be checked either it is diagonally dominant or not if it is not then it is made diagonally dominant. Secondly the first variable is calculated in terms of other variables from first equation and Second variable from second equation and so on after first iteration in the second iteration all the variables are replaced by the previous one.

Muller's Method : In Muller's method f(x)=0 is approximated by a second degree polynomial, that is by quadratic equation that fits through three points in the vicinity of a root .Then roots of this quadratic equation are then approximated to the roots of equation f(x)=0

Newton Raphson Method. : It is an open method which is used to locate a root of the equation, it needs only one initial approximation for it's first iteration. xn+1=xn-(fxn/f'xn)

Non singular matrix : A matrix is said to be non singular if the determinant of the matrix is non zero. |A| is not equal to zero and the inverse of non singular exists.

Open methods : The methods which require only one initial approximation to start the first iteration, for example the Newton's Raphsom method is known as the open method as it requires only one initial approximation.

Pivoting : If any of the pivot elements in gauss elimination become zero then this method fails so to Avoid such type of situation equation are rearranged to get rid of zero pivot element, this procedure is known as pivoting.

Precision : The extent of closeness of different measurement taken to estimate a certain value. Suppose you have done different iterations to measure the root of an equation and take different values as 2.1234, 2.1236, and 2.1238 these all the values are very close to each other so these are very precise.

Regula –Falsi method : It is also an iterative method and is a bracketing method and use intermediate value property to get it's initial guess. The formula used for this is xn+1=xn-(xn-xn-1/f(xn)-f(xn-1))

Relative Error : It is the ratio of the absolute error to the actual value of the quantity. Thus RE=AE=AE\|x*|

Relaxation method : It is also an iterative method and in this method you solve the system of equation by making the greatest residual to zero.

Root : If you have an equation f(x)=0 then the no a is said to be the root of the equation if f(a)=0 Suppose you have an equation f(x)=x2-4 the 2 is a root of the equation as f(2)=4-4=0

Secant Method : The secant method is also an open method and it takes two initial values for it's first approximation, the formula used for this is known as xn+1={xn-1f(xn)-xnf(xn-1)}/{f(xn)-f(xn-1)}

Significant digits : A significant digit in an approximate no is a digit, which gives reliable information about the size of the number. In other words a significant digit is used to express accuracy, that Is how many digits in the no have meaning.

Singular matrix : A matrix s said to be a singular matrix if the determinant of the matrix ix zero |A|=0,the inverse of the singular matrix do not exist.

Transcendental equation : An equation f(x) =0 is said to be transcendental equation if it contains trigonometric, logarithmic and exponential functions

Truncation Error : It is defined as the replacement of one series by another series with fewer terms.

Question: What is Bracketing method?

Answer: Methods such as bisection method and the false position method of finding roots of a nonlinear equation f(x) = 0 require bracketing of the root by two guesses. Such methods are called bracketing methods. These methods are always convergent since they are based on reducing the interval between the two guesses to zero in on the root.

SHORT QUESTION ANSWERS

Question: What is an Open method?

Answer: In the Newton-Raphson method, the root is not bracketed. Only one initial guess of the to get the iterative process started to find the root of an equation. Hence, the method falls in the category of open methods.

Question: Explain Muller's method briefly.

Answer: In Muller's method, f (x) = 0 is approximated by a second degree polynomial; that is b equation that fits through three points in the vicinity of a root. The roots of this quadra are then approximated to the roots of the equation f (x) 0.This method is iterative in n not require the evaluation of derivatives as in Newton-Raphson method. This method used to determine both real and complex roots of f (x) = 0.

Question: Explain the difference between the linear and non-linear equations.

Answer: Linear Equation An algebraic equation is said to be linear in which each term is either or the product of a constant and the first power of a single variable. One or more varia involved in the linear equations. e.g. x+3y+z=0 2x-y+4z=7 etc. Non-Linear Equation A is said to Non-Linear equation if it is not linear. Equations involving the power of the or higher, transcendental, logarithmic and trigonometric equations etc lie in the catego Non-Linear
equations. e.g. x2+5x+3=0 sinx+3y+9=0 xlogx-7x+4y=2 etc.

Question: Explain which value is to be choosed as X0 in N-R method.

Answer: If, for a given function, f(a)*f(b)<0, then any value between a and b inclusive can be c

Question: Define iterative method of solving linear equations with two examples.

Answer: Under iterative methods, the initial approximate solution is assumed to be known and towards the exact solution in an iterative way. We consider Jacobi, Gauss-Seidel and methods under iterative methods.

Question: Define Pivoting.

Answer: The Gaussian elimination method fails if any one of the pivot elements becomes zero. situation, we rewrite the equations in a different order to avoid zero pivots. Changing equations is called pivoting.

Question: Write the two steps of solving the linear equations using Gaussian Elimination method.

Answer: In this method, the solution to the system of equations is obtained in two stages. i) the of equations is reduced to an equivalent upper triangular form using elementary transf the upper triangular system is solved using back substitution procedure

Question: Describe Gauss-Jordan elimination method briefly

Answer: This method is a variation of Gaussian elimination method. In this method, the elemen below the diagonal are simultaneously made zero. That is a given system is reduced to diagonal form using elementary transformations. Then the solution of the resulting di

is obtained. Sometimes, we normalize the pivot row with respect to the pivot element, elimination. Partial pivoting is also used whenever the pivot element becomes zero.

Question: Describe briefly Crout's reduction method.

Answer: Here the coefficient matrix [A] of the system of equations is decomposed into the proc two matrices [L] and [U], where [L] is a lower-triangular matrix and [U] is an upper-tr matrix with 1's on its main diagonal.

Question: Describe briefly the Jacobi's method of solving linear equations.

Answer: This is an iterative method, where initial approximate solution to a given system of eq assumed and is improved towards the exact solution in an iterative way.

Question: What is the difference between Jacobi's method and Gauss Seidal method?

Answer: The difference between jacobi's method and gauss Seidel method is that in jacobi's m the approximation calculated are used in the next iteration for next approximation but method the new approximation calculated is instantly replaced by the previous one.

Question: What is the basic idea of Relaxation method?

Answer: We can improve the solution vector successively by reducing the largest residual to ze iteration. This is the basic idea of relaxation method.

Question: How the fast convergence in the relaxation method is achieved?

Answer: To achieve the fast convergence of the procedure, we take all terms to one side and the the equations so that the largest negative coefficients in the equations appear on the di

Question: Which matrix will have an inverse?

Answer: Every square non-singular matrix will have an inverse.

Question: What are the popular methods available for finding the inverse of a matrix?

Answer: Gauss elimination and Gauss-Jordan methods are popular among many methods availa the inverse of a matrix.

Question: Explain Gaussian Elimination Method for finding the inverse of a matrix.

Answer: In this method, if A is a given matrix, for which we have to find the inverse; at first, w identity matrix, whose order is same as that of A, adjacent to A which we call an augm Then the inverse of A is computed in two stages. In the first stage, A is converted into triangular form, using Gaussian elimination method In the second stage, the above up matrix is reduced to an identity matrix by row transformations. All these operations a on the adjacently placed identity matrix. Finally, when A is transformed into an identi the adjacent matrix gives the inverse of A. In order to increase the accuracy of the res l to employ partial pivoting

Question: What are the steps for finding the largest eigen value by power method.

Answer: Procedure Step 1: Choose the initial vector such that the largest element is unity. Step The normalized vector is pre-multiplied by the matrix [A]. Step 3: The resultant vecto again normalized.

Question: What is the method for finding the eigen value of the least magnitude of the matrix [A]?

Answer: For finding the eigen value of the least magnitude of the matrix [A], we have to

apply power method to the inverse of [A].

Question: What is interpolation?

Answer: The process of estimating the value of y, for any intermediate value of x, is called inte

Question: What is extrapolation?

Answer: The method of computing the value of y, for a given value of x, lying outside the table of x is known as extrapolation.

Question: What happens when shift operator E operates on the function.

Answer: When shift operator E operates on the function it results in the next value of the functi

Question: What is the basic condition for the data to apply Newton's interpolation methods?

Answer: To apply Newton's interpolation methods, data should be equally spaced.

Question: When is the Newton's forward difference interpolation formula used?

Answer: Newton's forward difference interpolation formula is mainly used for interpolating the the beginning of a set of tabular values and for extrapolating values of y, a short distan from y0.

Question: When is the Newton's forward difference interpolation formula used?

Answer: Newton's forward difference interpolation formula is mainly used for interpolating the y near the beginning of a set of tabular values and for extrapolating values of y, a shor backward from y0.

Question: When the Newton's backward difference interpolation formula is used?

Answer: For interpolating the value of the function y = f (x) near the end of table of values, and extrapolate value of the function a short distance forward from yn, Newton's backwar formula is used.

Question: What is the formula for finding the value of p in Newton's forward difference interpolation formula?

Answer: P=(x-x0)/h

Question: What is the formula for finding the value of p in Newton's backward difference interpolation formula?

Answer: P=(x-xn)/h

Question: If the values of the independent variable are not equally spaced then which formula should be used for int

Answer: If the values of the independent variable are not given at equidistant intervals, then the interpolation formula should be used.

Question: To use Newton's divided difference interpolation formula, what should the values of independent variable

Answer: To use Newton's divided difference interpolation formula, the values of independent v should not be equally spaced.

Question: Which difference formula is symmetric function of its arguments?

Answer: Divided difference formula is symmetric function of its arguments.

Question: Is the interpolating polynomial found by Lagrange's and Newton's divided difference formulae is same?

Answer: Yes. The interpolating polynomial found by Lagrange's and Newton's divided differe

formulae is one and the same.

Question: Which formula involves less number of arithmetic operations? Newton or Lagrange's?

Answer: Newton's formula involves less number of arithmetic operations than that of Lagrange

Question: When do we need Numerical Methods for differentiation and integration?

Answer: If the function is known and simple, we can easily obtain its derivative (s) or can evalu definite integral However, if we do not know the function as such or the function is co given in a tabular form at a set of points x0,x1,…,xn, we use only numerical methods differentiation or integration of the given function.

Question: If the value of the independent variable at which the derivative is to be found appears at the beginning of values, then which formula should be used?

Answer: If the value of the independent variable at which the derivative is to be found appears beginning of the table, it is appropriate to use formulae based on forward differences derivatives.

uestion: If the value of the independent variable at which the derivative is to be found occurs at the end of the tabl then which formula should be used?

Answer: If the value of the independent variable at which the derivative is to be found occurs a the table of values, it is appropriate to use formulae based on backward differences to derivatives.

Question: Why we need to use RICHARDSON'S EXTRAPOLATION METHOD?

Answer: To improve the accuracy of the derivative of a function, which is computed by starting arbitrarily selected value of h, Richardson's extrapolation method is often employed in

Question: To apply Simpson's 1/3 rule, what should the number of intervals be?

Answer: To apply Simpson's 1/3 rule, the number of intervals must be even.

Question: To apply Simpson's 3/8 rule, what should the number of intervals be?

Answer: To apply Simpson's 3/8 rule, the number of intervals must be multiple of 3.

Question: What is the order of global error in Simpson's 1/3 rule?

Answer: The global error in Simpson's 1/3 rule is of the order of 0(h4).

Question: Is the order of global error in Simpson's 1/3 rule equal to the order of global error in Simpson's 3/8 rule?

Answer: Yes. The order of global error in Simpson's 1/3 rule equal to the order of global error Simpson's 3/8 rule.

Question: What is the order of global error in Trapezoidal rule?

Answer: The global error in Trapezoidal rule is of the order of 0(h2).

Question: What is the formula for finding the width of the interval?

Answer: Width of the interval, h, is found by the formula h=(b-a)/n

Question: What type of region does the double integration give?

Answer: Double integration gives the area of the rectangular region.

Question: Compare the accuracy of Romberg's integration method to trapezoidal and Simpson's rule.

Answer: Romberg's integration method is more accurate to trapezoidal and Simpson's rule

Question: What is the order of global error in Simpson's 3/8 rule?

Answer: The global error in Simpson's 3/8 rule is of the order of 0(h4).

Question: Which equation models the rate of change of any quantity with respect to another?

Answer: An ordinary differential equation models the rate of change of any quantity with respe

Question: By employing which formula, Adam-Moulton P-C method is derived?

Answer: Adam-Moulton P-C method is derived by employing Newton's backward difference i formula.

Question: What are the commonly used number systems in computers?

Answer: Binary Octal Decimal Hexadecimal

Question: If a system has the base M, then how many different symbols are needed to represent an arbitrary number those symbols.

Answer: M 0, 1, 2, 3, … , M-1

Question: What is inherent error and give its example.

Answer: It is that quantity of error which is present in the statement of the problem itself, befor solution. It arises due to the simplified assumptions made in the mathematical modeli It can also arise when the data is obtained from certain physical measurements of the of the problem. e.g. if writing 8375 instead of 8379 in a statement lies in the category error.

Question: What is local round-off error?

Answer: At the end of computation of a particular problem, the final results in the computer, wh obviously in binary form, should be converted into decimal form-a form understandab user-before their print out. Therefore, an additional error is committed at this stage too This error is called local round-off error.

Question: What is meant by local truncation error?

Answer: Retaining the first few terms of the series up to some fixed terms and truncating the re terms arise to local truncation error.

Question: What is transcendental equation and give two examples.

Answer: An equation is said to be transcendental equation if it has logarithmic, trigonometric a exponential function or combination of all these three. For example it is a transcenden as it has an exponential function These all are the examples of transcendental equatio

Question: What is meant by intermediate value property?

Answer: If f(x) is a real valued continuous function in the closed interval if f(a) and f(b) have o signs once; that is f(x)=0 has at least one root such that Simply If f(x)=0 is a polynomi and if f(a) and f(b) are of different signs ,then f(x)=0 must have at least one real root b

Question: What is direct methods of solving equations?

Answer: Those methods which do not require any information about the initial approximation c start the solution are known as direct methods. The examples of direct methods are Gr squaring method, Gauss elimination method and Gauss Jordan method. All these meth

require any type of initial approximation.

Question: What is Iterative method of solving equations?

Answer: These methods require an initial approximation to start. Bisection method, Newton rap method, secant method, jacobi method are all examples of iterative methods

Question: If an equation is a transcendental, then in which mode the calculations should be done?

Answer: All the calculations in the transcendental equations should be done in the radian mode

Question: What is the convergence criterion in method of iteration?

Answer: If be a root of f(x) =0 which is equivalent to I be any interval containing the point x= a converge to the root provided that the initial approximation is chosen in I

Question: When we stop doing iterations when Toll is given?

Answer: Here if TOL is given then we can simply find the value of TOL by subtracting both th consecutive roots and write it in the exponential notation if the required TOL is obtain

Question: What is a trance dental equation?

Answer: An equation is said to be a transcendental equation if it has trigonometric, exponential logarithmic function or combination of all these functions.

Question: How the value of h is calculated in interpolation?

Answer: There are two types of data in the interpolation one is equally spaced and other is unec equally spaced data we need to calculate the value of h that is calculated by subtractin consecutive values and taking their absolute value.

Question: What is an algebraic equation?

Answer: An algebraic equation is an equation which is purely polynomial in any variable. Supposed x2+3x+2=0, x4+3x2=0, y3+6y2=0 all are algebraic equations as these are p polynomial in x and y variable.

Question: What is Descartes rule of signs?

Answer: The number of positive roots of an algebraic equation f(x) =0 can not exceed the no of signs. Similarly the no of negative roots of negative roots of and algebraic equation ca the no of changes in sign of equation f (-x) =0.

Question: What are direct methods?

Answer: The numerical methods which need no information about the initial approximation are direct methods like Graffee's root squaring method.

Question: What is meant by iterative methods?

Answer: The methods which need one or more iterations are known as iterative methods like bi method, Newton raphson method, and many other methods.

Question: What is graphically meant by the root of the equation?

Answer: If the graph of a function f(x) =0 cuts the x-axis at a point a then a is known as the roo equation.

Question: Q. What is the difference between open and bracketing method?

Answer: In open methods we need only one initial approximation of the root that may be any w

if it is not very close then we have to perform more iteration and the example of open
Newton raphson method. In bracketing method we bracket the root and find that interv
root lies means we need two initial approximations for the root finding. Bisection meth
an example of the bracketing method.

Question: Condition for the existence of solution of the system of equations.

Answer: If the |A| is not equal to zero then the system will have a unique solution if |A|=0 then
will have no solution

Question: Should the system be diagonally dominant for gauss elimination method?

Answer: The system of equation need not to be diagonally dominant for Gauss elimination met
gauss Jordan method for both the direct method it is not necessary for the system to b
dominant .it should be diagonally dominant for iterative methods like jacobie and gau
seidel method.

Question: What is meant by diagonally dominant system?

Answer: A system a1x+b1y+c1z=d1, a2x+b2y+c2z=d2, a3x+b3y+c3z=d3 is said to be diagona
dominant if the following condition holds.
|a1| => (greater or equal) |b1|+|c1| |b2| => (greater or equal) |a2|+|c2| |c3| =>
(greater or equal) |a3|+|b3|

Question: State the sufficient condition for the convergence of the system of equation by iterative methods.

Answer: A sufficient condition for convergence of iterative solution to
exact solution is
|a1| => (greater or equal) |b1|+|c1| |b2| => (greater or equal) |a2|+|c2| |c3| =>
(greater or equal) |a3|+|b3| For the system a1x+b1y+c1z=d1, a2x+b2y+c2z=d2, a3x+b
Similarly for the system with more variables we can also construct the same condition

Question: The calculation for numerical analysis should be done in degree or radians.

Answer: All the calculation for numerical analysis should be done in radians not in degrees set
calculator in radians mode and suppose the value of pi=3.14.

Question: How we can identify that Newton forward or backwards interpolation formula is to be used.

Answer: If the value at which we have to interpolate is in the start of the table then we will use
Newton's forward interpolation formula if it is at the end of the table then we will use
Newton's backward interpolation formula.

Question: What is meant precision and accuracy?

Answer: Precision and accuracy are two terms which are used in numerical calculations by prec
mean that how the values in different iterations agree to each other or how close are th
t values in successive iterations. For example you have performed 3 different iteration
result of all the iteration are 1.32514,1.32516,31.32518 these three values are very pre
these values agree with each other . Accuracy means the closeness to the actual value
that you have calculated an answer after some iteration and the answer is 2.718245 an
answer is 2.718254 and the answer calculated is very accurate but if this answer is 2.7
then it is not accurate.

Question: What is the condition that a root will lie in an interval.

Answer: Suppose that you have a function f(x) and an interval [a,b]and you calculate both f(a)and f(b)if f(a)f(b)<0 then there must exist a root for this function in this interval.In words f(a) and f(b)must have opposite signs.

Question: How the divided difference table is constructed?

Answer: x y First difference Second difference Third difference
1 0.2 y0 y1-y0/x1-x0=sy0 sy1- sy0/x2-x0=s2y0 s2y0-s2y1/x3-x0=s3y0 s3y1-s3y0/x4
2 0.69 y1 y2-y1/x2-x1=sy1 sy2- sy1/x3-x1=s2y1 s2y2-s2y1/x4-x1=s3y1 3 0.985
y2 y3-y2/x3-x2=sy2 sy3- sy2/x4-x1=s2y2 4 1.2365 y3 y4-y3/x4-x3=sy3 5 2.3651 y4
This is the complete table showing the central differences . Here s stands for differenc

Question: What is Gauss-seidel Method

Answer: It is also an iterative method and in this we also check either the system is diagonally and, if so then we proceed on the same lines as in the Jacobi's method. The difference when we calculate a value of any variable that is instantly replaced by the previous va . If we have initial values like x1=0,x2=0 and x3=0 in the case of three variables in the iteration we will use all the three values to calculate x1 but to calculate the value of x use the recent value of x1 which is calculated in the first iteration.

Question: What is partial and full pivoting?

Answer: Partial and full pivoting, In gauss elimination method when you have any of diagonal i zero it means the solution does not exist to avoid this we change the equation so that pivot is achieved .Now you have an argument matrix in which he elements in the first are 1,3,4 respectively here in case of partial pivoting we will replace first element with element it is done by replacing the first equation with last equation it is known as parti In full pivoting we change rows and columns but that is not implemented manually it used in computers.

Question: How the initial vector is choose in power method?

Answer: Choose the initial vector such that the largest element is unity. But no problem with th precede with this vector as it is and will not change it. In the given question the initial provided so you have to proceed with the given vector and will normalize this vector this vector you will keep in mind that the greatest value should be unity. An eigenvect be normalized if the coordinate of largest magnitude is equal to unity Actually this co the normalization of the vectors when you have to normalize the vector you keep in m larget entery in the vector must be 1 and so you take the largest element and divide the remaining values by the greatest value

Question: what is the relation ship between p=0 and non zero p in interpolation.

Answer: fp=fo+pDfo+1/2(p2-p)D2fo+1/6(p3-3p2+2p)D3fo+1/24(p4-6p3+11p2-6p)D4fo+…
This is the interpolation formula For the derivative you will have to take the derivative of this formula w.r.t p and you will get f'p=1/h{Dfo+1/2(2p-1)D2fo+1/6(3p2-6p+2)D Now put here p=0 f'p=1/h{Dfo+1/2(0-1)D2fo+1/6(0-0+2)D3fo+…} So the formula b s f'p=1/h{Dfo+D2fo/2+D3fo/3+…} so this is the relation ship between non zero and z when you have to calculate p the you use formula p=x-xo/h so this is the impact of x.

Question: What is chopping and Rounding off?

Answer: Chopping and rounding are two different techniques used to truncate the terms needed to your accuracy needs. In chopping you simply use the mentioned number of digits a

decimal and discard all the remaining terms.
Explanation (1/3 - 3/11) + 3/20=(0.333333…-0.27272727..)+0.15=(0.333-0.272)+0.15
This is the three digit chopping.

Question: When the forward and backward interpolation formulae are used?

Answer: In interpolation if we have at the start then we use the forward difference formula and calculate p is x-x0/h. If the value of x lies at the end then we use Newton's backward f formula to calculate the value of p is x-xn/h. Now I come to your question as in this c lies at the end so 6 will be used as the xn. This procedure has been followed by the tea lectures. But some authors also use another technique that is if you calculate the value that is negative then the origin is shifted to that value for which the value of p become And then according to that origin the values of differences are used and you need not f procedure.

Question: What is forward and backward difference operator and the construction of their table.

Answer: For forward Dfr =fr+1 –fr Df0 = f1-f0 In terms of y Dyr+1=yr+1-yr D stands for the f difference operator For backward Dfr =fr –fr-1 Df1 = f1-f0 In terms of y Dy1=y1-y0 stands for backwards operator Now the construction of the difference table is based on
1st forward 2nd forward 3rd forward
x1 Y1 Y2-Y1=Dy0 x2 Y2 Y3-Y2=Dy1 x3 Y3 Y4-Y3=Dy2 x4 Y4 Now consider the of table for the backward table
X Y 1st forward 2nd forward 3rd forward
x1 Y1 Y2-Y1=Dy1 x2 Y2 Y3-Y2=Dy2 x3 Y3 Y4-Y3=Dy3 x4 Y4 D
ear student this is the main difference in the construction of the forward and backwards difference table when you proceed for forward difference table you get in first difference the value Dy0 but in the construction of backwards difference table in the first difference you get Dy1 and in the second difference in the forward difference table you get D2 y0 and in the backward difference table the first value in the second difference is D2 y1. I think so you have made it clear.

Question: What is Jacobi's method?

Answer: Jacobi's Method It is an iterative method and in this method we first of all check eithe system is diagonally dominant and, if the system is diagonally dominant then we will the value of first variable from first equation in the form of other variables and from th equation the value of second variable in the form of other variables and so on. We are with the initial approximations and these approximations are used in the first iteration first approximation of all the variables. The approximations calculated in the first itera used in the second iteration to calculate the second approximations and so on.

Question: what is Simpson's 3/8th rule.

Answer: The general formula for Simpson's 3/8th rule is
3h/8[f0+3(f1+f2)+2f3+(3f4+f5)+2f6+…+3(fn-2+fn-1)+fn]
Now if we have to calculate the integral by using this rule then we can simply proceed just write first and last vale and distribute all the remaining values with prefix 3 and 2 Like you have f0,f1,f2,f3,f4 Then the integral can be calculated as 3h/8[f0+f4+3(f1+f2)+2f4] If we have values like f0,f1,f2,f3,f4,f5 Then integral can be calculated as 3h/8[f0+3(f1+f2)+2f3+3f4+f5] Similarly proceedin in this fashion we can calculate the integral in this fashion

Question: what is classic runge-kutta method

Answer: The fourth order Runge-Kutta method is known as the classic formula of classic Runge-Kutta method.
yn+1=yn+1/6(k1+2k2+2k3+k4) Where k1=hf(xn,yn) k2=hf(xn+h/2+yn+k1/2) k3=hf(xn+h/2,yn+k'2/2) k4=hf(xn+h,yn+k3)

Question: What is meant by TOL?

Answer: The TOL means the extent of accuracy which is needed for the solution. If you need th to two places of decimal then the TOL will be 10-2 .similarly the 10-3 means that the needed to three places of decimal. Suppose you have the root from last iteration 0.832 0.8324525 if we subtract both and consider absolute value of the difference 0.000000 can be written as 0.09*10-5 so the TOL in this case is 10-5.similarly if we have been p you have to for the TOL 10-2 you will check in the same way. In the given equation y solve the equation by any method and will consider some specific TOL and try to go t Some time no TOL is provided and you are asked to perform to some specific no of it

Question: what is meant by uniqueness of LU method.

Answer: An invertible (whose inverse exists) matrix can have LU factorization if and only if al principal minors(the determinant of a smaller matrix in a matrix) are non zero .The factorization is unique if we require that the diagonal of L or U must have 1's.the matrix has a unique LDU factorization under these condition .
If the matrix is singular (inverse does not exists) then an LU factorization may still ex , a square matrix of rank (the rank of a matrix in a field is the maximal no of rows or c k has an LU factorization if the first k principal minors are non zero. These are the con for the uniqueness of the LU decomposition.

Question: how the valu of h is calculated from equally spaced data.

Answer: Consider the following data x y 1 1.6543 2 1.6984
3 2.4546 4 2.9732 5 3.2564 6 3.8765 Here for h=2-1=3-2=1 x y 0.1 1.6543 0.2 1.6984 0.3 2.4546 0.4 2.9732 0.5 3.2564 0.6 3.8765 Here for the calculation of h =0.2-0.1=0.3-0.2=0.1 I think so that you may be able to understand .