MTH603 MCQs

The determinant of a diagonal matrix is the product of the diagonal elements.

- True
- False

The determinant of a _____ matrix is the product of the diagonal elements.

- Diagonal
- Upper triangular
- Lower triangular
- Scalar

Power method is applicable if the eigen vectors corresponding to eigen values are linearly independent. (Page 6)

- True
- False

Power method is applicable if the Eigen vectors corresponding the Eigen values are linearly

- Independent (Page 6)
- Dependent

Power method is applicable if the Eigen values are real and distinct.

- True
- False

Power method is applicable if the eigen values are _____.

- real and distinct
- real and equal
- positive and distinct

- negative and distinct

A 3 x 3 identity matrix have three and different eigen values.

- True
- False

A 3 x 3 identity matrix have three and _____Eigen values.

- same
- Different

If n x n matrices A and B are similar, then they have the different Eigen values (with the same multiplicities).

- True
- False

If n x n matrices A and B are similar, then they have the _____ eigenvalues (with the same multiplicities).

- same
- different

If n x n matrices A and B are similar, then they have the same eigenvalues (with the same multiplicities).

- TRUE
- FALSE

The Jacobi's method is a method of solving a matrix equation on a matrix that has ____ zeros along its main diagonal. (Bronshtein and Semendyayev 1997, p. 892)

- No
- At least one

The Jacobi's method is a method of solving a matrix equation on a matrix that has no

zeros along its main diagonal.

(Bronshtein and Semendyayev 1997, p. 892).

- True
- False

1.The Jacobi's method is a method of solving a matrix equation on a matrix that has no

zeros along its _____.

- main diagonal
- last column
- last row
- first row

1.An eigenvector V is said to be normalized if the coordinate of largest magnitude is equal to _____.

- Unity
- Zero

An eigenvector V is said to be normalized if the coordinate of largest magnitude is equal to zero.

- TRUE
- FALSE

1.The Gauss-Seidel method is applicable to strictly diagonally dominant or symmetric

positive definite matrices A.

- True
- False

The Gauss-Seidel method is applicable to strictly diagonally dominant or symmetric

definite matrices A.

- Positive
- Negative

Eigenvalues of a symmetric matrix are all _____.

- Real
- Zero
- Positive
- Negative

The Power method can be used only to find the eigenvalue of A that is largest in absolute value—we call this eigenvalue the dominant eigenvalue of A.

- True
- False

The characteristics polynomial of a 3x 3 identity matrix is _____, if x is the eigen values of the given 3 x 3 identity matrix. where symbol ^ shows power.

- (x-1)3
- (x+1)3
- x3-1
- x3+1

1.For differences methods we require the set of values

- True
- False

If x is an eigenvalue corresponding to eigenvalue of V of a matrix A. If a is any constant, then x – a is an eigen value corresponding to eigen vector V is an of the matrix A - a I.

- True
- False

Central difference method seems to be giving a better approximation, however it requires more computations.

- True
- False

1.Iterative algorithms can be more rapid than direct methods.

- True
- False

1.Central Difference method is the finite difference method.

- True
- False

1.The dominant or principal eigenvector of a matrix is an eigenvector corresponding to the

Eigen value of largest magnitude (for real numbers, largest absolute value) of that matrix,

- True
- False

Eigen values of a_____ matrix are all real.

- Symmetric
- Antisymmetric
- Rectangular
- Triangular

Simpson's rule is a numerical method that approximates the value of a definite integral by using polynomials.

- Quadratic
- Linear
- Cubic
- Quartic

1.In Simpson's Rule, we use parabolas to approximating each part of the curve. This proves to be very efficient as compared to Trapezoidal rule.

- True
- False

The predictor-corrector method an implicit method. (multi-step methods)

- True
- False

Generally, Adams methods are superior if output at many points is needed.

- True
- False

In Trapezoidal rule, the integral is computed on each of the sub-intervals by using linear interpolating formula, ie. For n=1 and then summing them up to obtain the desired integral.

- True
- False

The Trapezoidal rule is a numerical method that approximates the value of a_____.

- Indefinite integral
- Definite integral
- Improper integral
- Function

The need of numerical integration arises for evaluating the definite integral of a function that has no explicit _____ or whose antiderivative is not easy to obtain.

- Antiderivative
- Derivatives

In Runge – Kutta Method, we do not need to calculate higher order derivatives and find greater accuracy.

- TRUE
- FALSE

1.An indefinite integral may _____ in the sense that the limit defining it may not exist.

- diverge
- converge

1.The Trapezoidal Rule is an improvement over using rectangles because we have much less "missing" from our calculations. We used _____ to model the curve in trapezoidal Rule.

- straight lines
- curves
- parabolas
- constant

An improper integral is the limit of a definite integral as an endpoint of the interval of sintegration approaches either a specified real number or ∞ or - ∞ or, in some cases, as both endpoints approach limits.

- TRUE
- FALSE

1.Euler's Method numerically computes the approximate derivative of a function.

- TRUE
- FALSE

1.Euler's Method numerically computes the approximate _____ of a function.

- Antiderivative
- Derivative
- Error
- Value

1.If we wanted to find the value of a definite integral with an infinite limit, we can instead replace the infinite limit with a variable, and then take the limit as this variable goes to _____.

- Constant
- Finite
- Infinity
- Zero

Exact solution of 2/3 is not exists.

- TRUE
- FALSE

The Jacobi iteration converges, if A is strictly diagonally dominant.

- TRUE
- FALSE

1.The Jacobi iteration _____, if A is strictly diagonally dominant.

- converges
- diverges

Below are all the finite difference methods EXCEPT _____.

- jacobi's method
- newton's backward difference method
- Stirlling formula
- Forward difference method

If A is a nxn triangular matrix (upper triangular, lower triangular) or diagonal matrix, the eigenvalues of A are the diagonal entries of A.

- TRUE
- FALSE

Two matrices with the same characteristic polynomial need not be similar.

- TRUE
- FALSE

Differences methods find the _____ solution of the system.

- numerical
- Analytical

By using determinants, we can easily check that the solution of the given system of linear equation exits and it is unique.

- TRUE

- FALSE

Direct method can more rapid than iterative algorithms

- TRUE
- FALSE

The dominant eigenvector of a matrix is an eigenvector corresponding to the eigenvalue of largest magnitude (for real numbers, smallest absolute value) of that matrix.

- TRUE
- FALSE

The central difference method is finite difference method.

- True
- False

The absolute value of a determinant (|detA|) is the product of the absolute values of the eigenvalues of matrix A

- TRUE
- FALSE

Eigenvectors of a symmetric matrix are orthogonal, but only for distinct eigenvalues.

- TRUE
- FALSE

Let A be an n ×n matrix. The number x is an eigenvalue of A if there exists a non-zero vector v such that _____.

- Av = xv
- Ax = xv
- Av + xv=0
- Av = Ax

In Jacobi's Method, the rate of convergence is quite _____ compared with other

- methods.
- slow
- fast

Numerical solution of 2/3 up to four decimal places is _____.

- 0.667
- 0.6666
- 0.6667
- 0.66667

Euler's method is only useful for a few steps and small step sizes; however Euler's method together with Richardson extrapolation may be used to increase the _____.

- order and accuracy
- divergence

The first langrange polynomial with equally spaced nodes produced the formula for _____.

- Simpson's rule
- Trapezoidal rule
- Newton's method
- Richardson's method

The need of numerical integration arises for evaluating the indefinite integral of a function that has no explicit antiderivative or whose antiderivative is not easy to obtain.

- TRUE
- FALSE

The Euler method is numerically unstable because of _____ convergence of error.

- Slow
- Fast

- Moderate
- No

Adams – Bashforth is a multistep method.

- True
- False

Multistep method does not improve the accuracy of the answer at each step.

- False
- True

1.Generally, Adams methods are superior if output at _____ points is needed.

- Many
- Two
- Single
- At most

Symbol used for forward differences is

- ∇
- Δ
- δ
- μ

The relationship between central difference operator and the shift operator is given by

- $\delta = E - E^{-1}$
- $\delta = E + E^{-1}$
- $\delta = E^{1/2} + E^{-1/2}$
- $\delta = E^{1/2} - E^{-1/2}$

Muller's method requires --------starting points

- 1
- 2

- 3
- 4

If we retain r+1 terms in Newton's forward difference formula, we obtain a polynomial

of degree ---- agreeing with y_x at x_0, x_1, ……. X_n.

- r+2
- r+1
- **r**
- r-1

Octal number system has the base ----------

- 2
- 8
- 10
- 16

Newton's divided difference interpolation formula is used when the values of the are

- Equally spaced
- Not equally spaced
- Constant
- None of the above

Rate of change of any quantity with respect to another can be modeled by

- An ordinary differential equation
- A partial differential equation
- A polynomial equation
- None of the given choices

Adam-Moulton P-C method is derived by employing

- Newton's backward difference interpolation formula
- Newton's forward difference interpolation formula
- Newton's divided difference interpolation formula
- None of the given choices

Bisection method is …….. method

- Bracketing Method
- Open
- Random
- none

Newton Raphson method is …….. method

- Bracketing Method
- Open
- Random
- none

Eigenvalue is

- Real
- Vector
- odd
- even

Bisection and false position methods are also known as

- bracketing method
- open method
- random

The Inverse of a matrix can only be found if the matrix is

- Singular
- Non singular
- Scalar
- Diagonal

If f (x) contains trigonometric, exponential or logarithmic functions then this equation is known as

- Transcendental equation
- Algebraic
- Polynomial
- Linear

In interpolation δ is used to represent the

- Forward difference
- Central difference
- Backward difference

The base of the decimal system is _____

- 10
- 0
- 2
- 8
- None of the above

Bisection and false position methods are also known as bracketing method and are always

- Divergent
- Convergent

P in Newton's forward difference formula is defined as

- P=(x-x0)/h
- P=(x+x0/h
- $P=(x+x_n)/h$
- $P=(x-x_n)/h$

Newton's divided difference interpolation formula is used when the values of the are

- Equally spaced
- Not equally spaced
- Constant
- None of the above

Given the following data

X	0	1	2	4
F(x)	1	1	2	5

The value of f(2,4) is

- 1.5
- 3
- 2
- 1