Question # 1

1 point possible (graded, results hidden)

Question # 1: Suppose the dimension of matrix A is 20×19. What will be the dimension of output of the following operation $A^T A$?

- ○ 20×19.
- ◉ 19×19.
- ○ 20×20.
- ○ None of the above.

Question # 2 EDIT

Question # 2

1 point possible (graded, results hidden)

Question # 2: Which of the following approaches is correct to solve an overdetermined system?

- ○ $A^T x = A^T b$.
- ○ $AA^T x = A^T b$.
- ◉ $A^T Ax = A^T b$.
- ○ None of the above.

Question # 3

1 point possible (graded, results hidden)

Question # 3: Which of the following set of vectors forms an orthonormal set?

- ○ $\left\{ (1,0), (0,1) \right\}$.
- ○ $\left\{ \frac{1}{\sqrt{2}}(1,1), \frac{1}{\sqrt{2}}(1,-1) \right\}$.
- ◉ Both of the above.
- ○ None of the above.

Question # 4

1 point possible (graded, results hidden)

Question # 4: Consider the data values $x = [2, 3, 4, 5]$ and $f(x) = [10, 20, 30, 55]$ respectively for an overdetermined system. Which of the following culd be the best-fit polynomial for the overdetermined system?

- (●) $p_2(x)$.
- ( ) $p_4(x)$.
- ( ) $p_3(x)$.
- ( ) Both $p_2(x)$ and $p_3(x)$.

Question # 5 EDIT

Question # 5

1 point possible (graded, results hidden)

Question # 5: The matrix A in the QR-decomposition method is of order $m \times n$ with m greater than equals to n and hence the solution can be of degree $n - 1$. But if $m < n$, then there will

- (●) be infinitely many solutions.
- ( ) exist a solution of $(n - 1)$ degree polynomial.
- ( ) exist a solution of $(m - 1)$ degree polynomial.
- ( ) None of the above is correct.

Question # 6

1 point possible (graded, results hidden)

Question # 6: A 20×20 matrix, A, is changed to an upper triangular form by the row operation in the Gaussian elimination method. After the completion of the 3rd row operation, how many matrix elements of A have been changed to zero by the row operations?

- ○ 51.
- ○ 57.
- ◉ 54.
- ○ None of the above.

Question # 7

1 point possible (graded, results hidden)

Question # 7: A 5×5 matrix, A, is changed to an upper triangular form by the row operation in the Gaussian elimination method. After the completion of the 2nd row operation, how many matrix elements of A have been changed to zero by the row operations?

- ◉ 7.
- ○ 8.
- ○ 9.
- ○ None of the above.

Submit You have used 0 of 1 attempt

Question # 8

1 point possible (graded, results hidden)

Question # 8: Suppose you have constructed a lower triangular matrix using LU-decomposition method. The matrix will have

- ○ all 0's in the lower triangle part.
- ◉ all 1's in the left to right diagonal elements.
- ○ all 0's in the left to right diagonal elements.
- ○ None of the above.

Question # 9

1 point possible (graded, results hidden)

Question # 9: Which of the following about pivoting is true?

- ○ Pivoting means to replace with a random value wherever there is a zero element in the matrix.
- ◉ Pivoting is used when there are 0's in the diagonals of the matrix.
- ○ Pivoting means swapping rows and columns when there are 1s.
- ○ All of the above are true.

Question # 10 EDIT

Question # 10

1 point possible (graded, results hidden)

Question # 10: How many operations are required to solve a linear system $Lx = b$? Here L is a 4×4 matrix.

- ◉ 16.
- ○ 14.
- ○ 12.
- ○ None of the above.

Question # 11

1 point possible (graded, results hidden)

Question # 11: What is the computational complexity of finding the upper triangular matrix during Gaussian Elimination?

- (●) $\mathcal{O}(n^3)$.
- ( ) $\mathcal{O}(n^2)$.
- ( ) $\mathcal{O}(n)$.
- ( ) None of the above.

Question # 12 EDIT

Question # 12

1 point possible (graded, results hidden)

Question # 12: A linear system is given by $Ax = b$. What is the advantage of using the LU-decomposition method over the Gaussian Elimination method to solve the linear system?

- ( ) Only the upper triangular matrix can be reused to solve the linear system that differs by the values of b.
- (●) Both lower and upper triangular matrices can be reused to solve the linear system that differs by the values of b.
- ( ) There is no advantage.
- ( ) None of the above.

Question # 13

1 point possible (graded, results hidden)

Question # 13: An overdetermined system has three variables that need to satisfy four equations. The solution of the system by least squares method can be determined using

- (●) Degree two polynomial.
- ( ) Degree four polynomial.
- ( ) Degree one polynomial.
- ( ) None of the above.

Question # 14

1 point possible (graded, results hidden)

Question # 14: Which of the following represents the Orthonormal property?

- (●) $\delta_{ij} = \begin{cases} 1 & ; \quad i = j \\ 0 & ; \quad i \neq j \end{cases}.$
- ( ) $\delta_{ij} = \begin{cases} 1 & ; \quad i \neq j \\ 0 & ; \quad i = j \end{cases}.$
- ( ) Both of the above.
- ( ) None of the above.