Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-02-13, 23:59 IST.

1) For solving \(A\phi = b\) using an iterative solver such that \(\phi^{(n)} = B\phi^{(n-1)} + Cb\). Which is true?

- \(B + CA = I\) ensures that the solution will not change with subsequent iterations once exact solution is reached.
- Spectral radius of \(B\) should be less than 1
- Some sort of stopping criteria is necessary for checking convergence of the iterations.
- All of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of the above

2) For Jacobi method, \(M\phi^{(n)} = N\phi^{(n-1)} + b\) is used to solve \(A\phi = b\) and \(A\) is written as \(A = L + D + U\), then

- \(M = D\) and \(N = L + U\)
- \(M = D^{-1}\) and \(N = L + U\)
- \(M = (D + L)\) and \(N = U\)
- \(M = (D + L)^{-1}\) and \(N = U\)

No, the answer is incorrect.
Score: 0
1. \( \mathbf{M} = \mathbf{D} \) and \( \mathbf{N} = \mathbf{L} + \mathbf{U} \)
   - \( \mathbf{M} = \mathbf{D}^{-1} \) and \( \mathbf{N} = \mathbf{L} + \mathbf{U} \)
   - \( \mathbf{M} = (\mathbf{D} + \mathbf{L}) \) and \( \mathbf{N} = \mathbf{U} \)
   - \( \mathbf{M} = (\mathbf{D} + \mathbf{L})^{-1} \) and \( \mathbf{N} = \mathbf{U} \)

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   \( \mathbf{M} = (\mathbf{D} + \mathbf{L}) \) and \( \mathbf{N} = \mathbf{U} \)

2. If \( \mathbf{L} \) is the factorized sparse lower triangular matrix for a symmetric matrix \( \mathbf{A} \) obtained using \( \text{ILU}(0) \) factorization, then the preconditioning matrix \( \mathbf{P} \) for \( \mathbf{A} \) is given by
   - \( \mathbf{L} \)
   - \( \mathbf{L}^T \)
   - \( \mathbf{L} L^T \)
   - \( \mathbf{L}^T L \)

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   \( \mathbf{L} \mathbf{L}^T \)

3. What is the advantage of using \( \text{ILU}(0) \) factorization?
   - Preconditioner has only twice the size of the original matrix
   - It mimics the non-zero sparsity of the original matrix
   - Convergence of the iterative method remains same compared with complete \( \text{LU} \) factorization
   - None of the above

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   It mimics the non-zero sparsity of the original matrix

4. Which is true for \( \text{DILU} \) factorization?
   - In the \( \text{DILU} \) factorization the fill-in of the off-diagonal elements is eliminated and only the diagonal elements are modified
   - \( \text{DILU} \) uses more memory than other \( \text{ILU} \) factorizations
   - Both of the above
   - None of the above

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   In the \( \text{DILU} \) factorization the fill-in of the off-diagonal elements is eliminated and only the diagonal elements are modified
7) Necessary condition for using gradient methods for solving system of linear equations $Ax = b$

- Matrix $A$ should be symmetric
- Matrix $A$ should be positive definite
- The quadratic minimization function $Q(\phi)$ has a global minimum
- All of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
All of the above

8) If matrix $P$ and $A$ are symmetric, then $P^{-1}A$ is

- Necessarily symmetric
- Maybe symmetric
- Necessarily anti-symmetric
- Diagonal matrix

No, the answer is incorrect.
Score: 0
Accepted Answers:
Maybe symmetric