

Examples of possible questions

1. Sparse matrices: definitions, storage schemes. Relation to graphs.
2. Sparse Cholesky: fill-in lemma, fill-in theorem, necessary and sufficient condition for a fill-in entry in the Cholesky factor L (extended fill-in theorem).
3. Elimination tree, its construction and importance
4. Row Cholesky subtrees, column/row counts in Cholesky factor
5. Symbolic factorization, row and column structure in Cholesky
6. Supernodes, topological reorderings, postordering
7. Sparse Cholesky: synthesis – Block column Cholesky, Row Cholesky, Multifrontal method
8. Graph models for sparse LU factorization – dag, column structures, row structures
9. Initial matrix reorderings to minimize fill/in
10. LU factorization, pivoting (threshold, Markowitz) and stability
11. Symmetric indefinite matrices and their factorization – full pivoting and sparse partial pivoting.