

- (1) Describe in detail the modified Gram-Schmitt algorithm.
To receive credit for this problem you must complete all of the following
- (i) Write out the algorithm as presented in class.
 - (ii) Write and answer the 3 algorithm questions for modified Gram-Schmitt
 - (iii) Clearly explain what each step of the algorithm is doing and why.
- (2) Write an algorithm which takes two vectors $x, y \in \mathbb{C}^n$ as its inputs, and does the following
- (i) Builds the degree 4 vandermonde matrix A using the vector x .
 - (ii) Uses modified Gram-Schmitt to compute a QR factorization of A .
 - (iii) Computes the inverse of Q, Q^*
 - (iv) Uses backsubstitution to solve the system $R\alpha = Q^*y$
 - (v) Uses the solution α as the coefficients for the degree 4 interpolating polynomial.

Notes on problem (1):

To receive credit your explanations cannot be particularly vague. You must clearly define all objects, how they are being used and why they are being used in that way for every step of the algorithm.

Remember that the algorithm is motivated by the properties of Q and R in the QR factorization it produces!

Notes on problem (2):

You may reuse any algorithm written for your first take-home exam so long as it was written correctly. You must cite your previous exam if you do this, as well as re-submit the exam if you did not email your original submission.

All algorithms must have the 3 questions answered!

You should write each portion of your algorithm as a subalgorithm.