

# Homework 3\*

Algorithms  
Spring 2020 CS207@IITG

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- (1) Give an example with 4 men and 4 women, with respective preference lists. Identify valid and best valid partners for each man and each woman in this example. Execute Gale-Shapley's algorithm with this example as input; argue output produced by this algorithm is a stable matching.
- (2) In the  $O(n^2)$  worst-case time algorithm for verifying whether  $AB = C$  for  $n \times n$  matrices  $A, B$ , and  $C$ , apply the principle of deferred decision in upper bounding the error probability when the  $(1, 1)$  entry  $d_{11}$  of matrix  $D = AB - C$  is equal to 0.
- (3) Prove the following: Assuming  $n$  is not an absolute pseudoprime, if  $b^{n-1} \not\equiv 1 \pmod n$  for some  $1 \leq b < n$  with  $\gcd(b, n) = 1$ , then there are at least as many integers in  $[1, n)$  that fail the Fermat's test as the number of integers in that range that pass the Fermat's test.

— more problems will be added —

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