

- ① APPLICANTS A, \dots, F ARE APPLYING FOR 5 JOBS: J_1, \dots, J_5 .
IF EACH APPLICANT IS QUALIFIED FOR THE JOBS LISTED,
FIND A MAXIMUM MATCHING.

A: J_1, J_2, J_4

B: J_1, J_4, J_5

C: J_1, J_4, J_5

D: J_1, J_5

E: J_2, J_3, J_5

F: J_2, J_4

- ② SEVEN WOMEN ARE APPLYING FOR 8 MANAGERIAL POSITIONS A, \dots, H ,
WITH EACH OF THEM QUALIFIED FOR THE POSITIONS LISTED:

ANGIE A, B, F

BRENDA B, C, F

CAROL C, E, A

HELEN D, G, H

MIA E, A, F

SANDRA F, A, C

DAWN C, E, F

- a) DETERMINE IF EVERY WOMAN CAN FILL A POSITION, USING HALL'S TH.
b) FIND A MAXIMUM MATCHING.

- ③ LET A_1, \dots, A_n BE SUBSETS OF A SET S .
SHOW THAT IT IS POSSIBLE TO SELECT DISTINCT ELEMENTS
 s_1, \dots, s_n OF S WITH $s_i \in A_i$ FOR EACH i IFF
FOR EVERY SUBSET I OF $\{1, \dots, n\}$, $|I| \leq \left| \bigcup_{i \in I} A_i \right|$, USING HALL'S TH.

- ④ SHOW THAT IF EACH EDGE OF K_6 IS COLORED EITHER BLUE OR GREEN,
THEN THERE MUST BE A BLUE TRIANGLE OR A GREEN TRIANGLE.

