CSCI 357: HW 5 (due 04/08/2025) **Your Name:** _____

Problem 1. For each of these statements, circle whether they are **T** (True) or **F** (False). You **do not need to provide a justification** but to practice the concepts, try coming up with proof outlines for the True statements and counter-examples for the False statements.

T **F** Stable matchings are **unique**—that is, there cannot be two different matchings M_1 and M_2 on the same instance that are both stable.

T **F** Suppose candidates in a stable matching market with n candidates and n jobs do not submit complete preference rankings (list less than n acceptable partners on their list). Then it is possible for some candidates/jobs to go unmatched in a stable matching.

T **F** It is only possible to achieve one of the two properties—stability or strategyproofness (for both sides)—in a stable matching market.

T **F** Consider a job j with preference list P_j in a candidate-proposing DA algorithm. Suppose j reports P'_j and all other preferece lists P_{-j} are fixed. Then, then the stable matching M output when the input is (P'_j, P_{-j}) might be unstable with respect to preferences (P_j, P_{-j}).

T **F** Consider a job j with preference list P_j in a candidate-proposing DA algorithm. Suppose j is matched to candidate c in this matching. Consider a new preference list of j, P'_j which is the same as P_j but is cutoff at c: that is, j removes c and all candidates below c from the list. If we run the candidate-proposing DA algorithm on (P'_j, P_{-j}) (keeping the preferences P_{-j} fixed), then j will be matched to a candidate c^* that they prefer over c.