Name:

Problem 1 (Committee Forming) *The student council has 6 first-year students, 4 second-year students, 3 third-year student, and 8 fourth-year students.*

(a) How many ways are there to form a committee consisting of one student from each year?

(b) How many ways are there to form a committee consisting of two students from each year?

(c) How many ways are there to form a committee with the same number of students from each year, regardless of how many there are?

(d) How many ways are there to form a committee consisting of two underclass (1st/2nd year) and two upperclass (3rd/4th year) students?

(e) Each member of the student council shakes the hand of each other member exactly once. How many handshakes occur?

(f) Each member of the student council is either on the subcommittee for student life, academics, or clubs. How many possible assignments of members to subcommittees are there? (Subcommittees are allowed to be empty. No member can be in more than one subcommittee.)

PROBLEM 2 (BONUS PROBLEM) **Error Correction Codes** *are a tool used to ensure that messages get transmitted properly even when the message is susceptible to errors in transmission. My messaging server does something simpler: it doesn't correct errors, but it can detect if there's been a single error in the message sent. To do so, the server has a set of "legal messages". To ensure that any single error is caught, for any length n, there are no two messages in my set that are both length n and differ by exactly one letter. For example, if "abc" is a legal message, then "abd" can not be. (This way, if I receive "abd," I know it was an error.) What is the largest number of legal n-letter messages possible? (Messages consist only of lowercase letters.)*