

List of possible projects.

1. Suppose a particle is to be moved from the origin to the point $(7, 7)$ in the plane.
 - (a) In how many ways can this be done if the only legal moves are moves of the type: (see example 1.14, page 9)
$$(R) : (x, y) \rightarrow (x + 1, y); \quad (U) : (x, y) \rightarrow (x, y + 1)?$$
 - (b) How many of the paths in part (a) do not rise above the line $y = x$? (They are allowed to touch, but not cross over this line.)
 - (c) Answer parts (a) and (b) if a third type of move $(D) : (x, y) \rightarrow (x + 1, y + 1)$ is allowed.
2. Suppose two students, call them S_1 and S_2 , are finalists for outstanding english major in their college graduating class. A committee of 24 faculty members will each select one of the candidates to be the winner and place his or her choice (checked off on a ballot) into the ballot box. Suppose S_1 receives 14 votes and S_2 receives 10 votes. In how many ways can the ballots be selected, one at a time, from the ballot box so that there are always more votes in favor of S_1 ?
3. Consider a 10×6 grid of integer coordinate points in the first quadrant of the plane. How many different rectangles (with integer coordinate corners) does this grid contain?
4. What is the sum of all the five-digit integers obtained from the arrangements of the digits 1, 2, 3 and 4? Answer the same question for all six-digit integers obtained by arranging the digits 1, 1, 1, 3, 3, and 7.