

15-123 Homework 1

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Question 1.

Count the rectangles of all sizes and of all positions that are formed using segments in a grid with m horizontal and n vertical lines.

Solution. A rectangle is uniquely described by two distinct vertical lines and two distinct horizontal lines. Therefore we can just select these two lines and multiply these quantities by rule of product:

$$\binom{n}{2} \binom{m}{2}$$

2. Anagrams

How many ways are there to rearrange the letters in the word “anagram”?

Solution. We can choose an arrangement of the letters in “anagram” in two steps. We first choose 3 of the 7 positions to be a’s, then permute “ngrm” in the remaining positions. Thus, we have

$$\binom{7}{3} 4!$$

ways to choose an arrangement.