

## COUNTING AND RECURRENCES

CROSSROADS ACADEMY  
MATHCOUNTS PREPARATION

I) How many ways can a  $2 \times n$  board be tiled with dominoes?

II) How many binary strings of length  $n$  have no consecutive ones?

III) How many ways are there to represent  $n$  as a sum of three ordered summands?

IV) How many ways are there to represent  $n$  as a sum of  $k$  ordered summands?

a) How many ways are there to arrange  $n$  distinct books on a shelf?

b) How many ways are there to arrange  $n$  distinct books on a circular shelf?

c) Four people are standing in a line. In how many ways can they rearrange themselves so that no one is standing in the same spot that they were originally?

d)  $n$  people standing in a line rearrange themselves into a new random order. What is the probability that no one is standing in the same spot that they were in originally?