Math 174, Fall 2003, Solution to Quiz 7

Problem: How many solutions does the equation $y_1 + y_2 + y_3 + y_4 = 32$ have, if every y_i is an integer at least 2 ?

Answer: The above question is equivalent to: "How many solutions does

$$(*) \qquad y_1' + y_2' + y_3' + y_4' = 24$$

have, if every y_i' is an integer at least 0 ?" The connection between the two problems is that $y_i = y_i' + 2$. To solve the second problem, I carry a bucket with 24 rocks into the work room. I distribute my rocks into four bins: the y_1' -bin, the y_2' -bin, the y_3' -bin, and the y_4' -bin. Every distinct distribution corresponds a solution to (*). Each work order with 24 d's and 3 s's gives rise to a distinct disttibution of my rocks. Thus there are $\boxed{\binom{24+3}{3}}$ solutions to the problem.