

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

(*)
$$y'_1 + y'_2 + y'_3 + y'_4 = 24$$

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

distribution of my rocks. Thus there are $\boxed{\binom{24+3}{3}}$ solutions to the problem.