

171.312 Statistical Physics and Thermodynamics

Homework due Wednesday, Sept 7 to Damien Benveniste in section.

1. How many 10 digit numbers can be formed using 1 and 9 only?
2. At the start of a physics workshop, every physicist shakes hands with every other physicist in the room. There are 66 total handshakes. How many physicists are in the room?
3. Six coins are tossed simultaneously. For how many of outcomes will there be at most three of the coins that are heads?
4. How many 5 digit numbers can be formed that are divisible by 3 using the numerals 0,1,2,3,4,5 without repetition?
5. How many ways can 3 students and their respective 3 advisors stand in a line such that none of the 3 students stands in a position that is ahead of their respective advisor?
6. Physicists at a conference need to take a bus to dinner. The bus is only large enough to take r of the n physicists.
 - (a) How many ways are there to load the physicists on the bus?
 - (b) One of the n physicists happens to be so critical of his colleagues that no one wants to go with him. Yet, they must decide one way or the other. Either they will include him in filling up the bus or they won't. For each of these two distinct scenarios, calculate the number of ways to load the bus.
 - (c) Write down the general equation that relates the answer to part (a) to the two answers in part (b).
7. What is the coefficient for x^3 in $(2x+4)^8$?
8. Calculate the value of e . Use the Binomial Theorem to calculate $(1+1/n)^n$. Explicitly write out the first 5 terms of the sum. Then, take the limit as $n \rightarrow \infty$.