

Practice Midterm 4 – Math 154

Time: 40 Minutes | No notes allowed

Questions carry equal weight | Calculators allowed

Question 1. Let \mathcal{S} be the set of subsets of $[2n] := \{1, 2, \dots, 2n\}$ in which every element is even, and let \mathcal{T} be the set of subsets of $[2n]$ in which every element is less than $n + 1$. Find a bijection $f : \mathcal{S} \leftrightarrow \mathcal{T}$.

Question 2. State the inclusion-exclusion formula. Use the formula to determine how many integers in $\{1, 2, \dots, 100\}$ are divisible by a single digit prime number?

Question 3. Solve the recurrence equation $a_n = a_{n-1} + 2a_{n-2}$ with initial conditions $a_0 = a_1 = 1$.

Question 4. Find the number of binary strings of length n not containing 011 or 001.

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