MAT 2348 — assignment #1

Due: february 2nd.
Numeric answers need to be justified.
Don't Panic.

A

We consider postal codes that are sequences of three letters, followed by three digits.

1. How many different postal codes are there?

2. How many postal codes do not use the letter B?

3. How many postal codes are such that the sum of the three digits is 7?

B

We consider the letters of the word BARBAPAPA.

1. How many word can we form with these letters?

2. How many words formed with these lettes do not have two consecutive A?

3. How many words formed with these lettes contain the sequence BABA or the sequence ABBA?

C

1. Show that the fraction $\dfrac{(n+1)(n+2)\cdots(n+k)}{k!}$ is an integer for all n and k.

2. Show that $n^k \geq \mathbf{A}_k^n$ for all n and k. For which values of k is this an equality? *(try to give a combinatorial argument)*

D

1. Show that $\binom{n}{k}(n-k) = \binom{n-1}{k}n$.

2. What is the value of $\sum_{k=0}^{n} \binom{n}{k}2^{2k}$?

3. Show that $\binom{n}{k} + \binom{n}{k+1} = \binom{n+1}{k+1}$.

(for questions 1. & 3., try to give a combinatorial argument)