CO 330 LECTURE 15 SUMMARY PART 2

FALL 2026

Summary

Today continued by introducing integer partitions.

Definition 1. *An* integer partition *is a finite sequence* $\lambda = (\lambda_1, \lambda_2, \ldots, \lambda_k)$ *of positive integers with* $\lambda_1 \geq \lambda_2 \geq \cdots \geq \lambda_k > 0$. *The* λ_i *are called the* parts *of* λ. $k = k(\lambda)$ *is called the* length *of* λ. $n = n(\lambda) = \lambda_1 + \cdots + \lambda_k$ *is called the* size *of* λ. *We write* $\lambda \vdash n$ *and read that as "*λ *is a partition of* n*". There is one empty partition of size* 0 *which also has length* 0.

We usually don't write the parentheses and commas when writing a partition as a sequence.

We gave all the partitions of 5 as an example. There are 7 of them.

It is also worth contrasting this with the integer *compositions* you may recall from math 239/249. For compositions different orders are different compositions. As an example we wrote out all the compositions of 5 and there are 16 of them. We write $c \vDash n$ to say c is a composition of n.

Next time

We will continue discussing integer partitions.

References

- `https://enumeration.ca/extensions/partitions/`
- Chapter 9 of `https://melczer.ca/330/WagnerNotes.pdf`