MAT631 PROBLEM SET 5

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Last Date of Submission. 28 February, 2025.

Instructions. Please read the instructions on the course website carefully before submitting your solution(s).

Questions.

(1) **(Shubham)** Complete the proof of the hook-length formula (as mentioned in the lecture).

(2) **(Anant)** Generalize the construction in Viennot's shadows to biletter words and SSTs.

(3) **(Saikat)** Prove that there is a bijection between pairs (τ, v) with τ a SST of shape λ and v is a non-decreasing word, and pairs (τ', λ) where τ' is a tableau of shape μ such that $\mu \setminus \lambda$ is a horizontal strip.

(4) **(Anubhav)** Give a detailed proof of the following formula:

$$h_n = \sum_{\mu \vdash n} \frac{p_\mu}{z_\mu}.$$

(5) **(Kanak)** Give a detailed proof of the following formula:

$$e_n = \sum_{\mu \vdash n} \frac{(-1)^{n-\ell(\mu)} p_\mu}{z_\mu}.$$

Date: 19 February 2025.