Exercise 1. Describe a "ballot-type" condition for a word of 1's and 2's to be lowest weight for $\mathfrak{sl}_2$, that is, that F sends the word to 0. Prove that your condition is correct. Do the same for $\mathfrak{sl}_3$ and the two lowering operators.

Answer

Recall a word is Yamanouchi when every suffix has partition content. This occures when reading right-to-left, $\#i's \geqslant \#i+1's$. The reverse condition of this is precisely being a ballot word, when every prefix left-to-right has more $i+1$'s than i's.