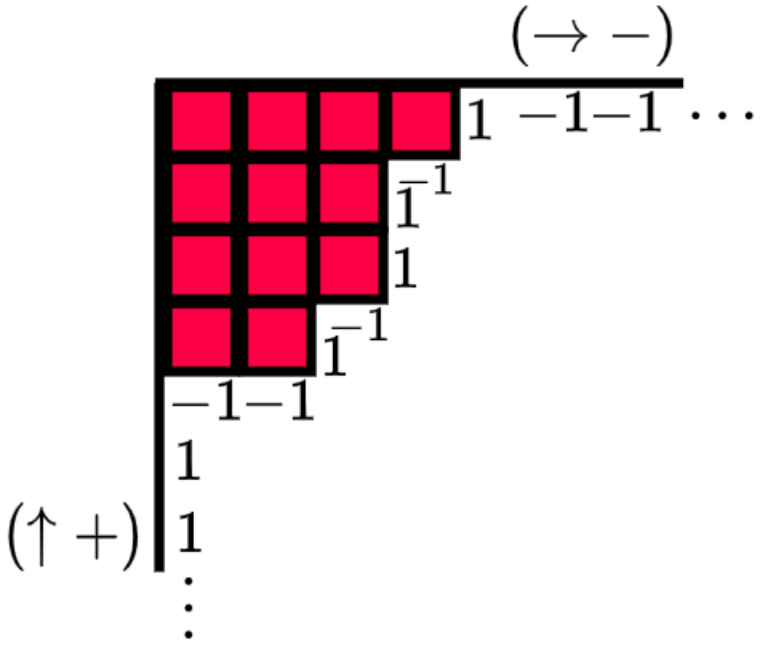
DSRI Background Page

Regarding Maya Diagrams and their connection to Young Diagrams:
Let's consider the partition given by $\lambda = (4, 3, 3, 2)$. For λ, the corresponding Young diagram (using English/Matrix-style notation) would appear as the following:

The diagram has 4 blocks for the first row, 3 blocks for the second and third rows, and 2 blocks for the final row; it follows the order of $(4, 3, 3, 2)$.

Now that we have the Young diagram, let's generate its "text-based" Maya diagram. We will need to be a bit more precise with our "boxes", so instead of using our Python-based output, we will use a larger, labeled version that is easier to work with:



Here, we will adopt the convention that moving *up* in this diagram corresponds to moving in the *positive* direction, and moving *right* corresponds to moving in the *negative* direction. Consider each the side length of each block as unit length, and label the diagram from the bottom left corner to the top right corner.

Remark: If we initally used the less common French/Coordinate notation for our Young diagrams, the directions would be more intuitive.

Now, for the text-based Maya diagram, we simply list out the -1 and 1 values in the same direction we labeled them. In this case, we would have the sequence:

$$..., 1, 1, -1, -1, 1, -1, 1, 1, -1, 1, -1, -1, ...$$

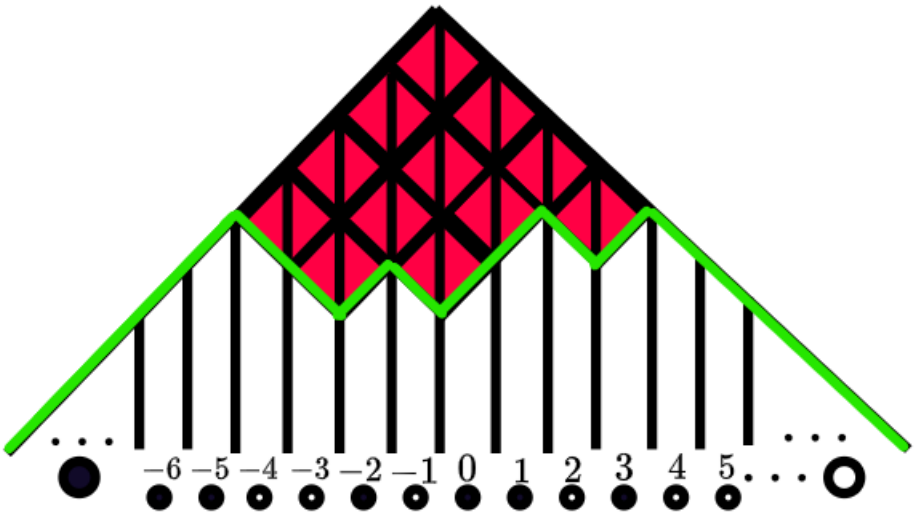
Notation: For the values that infinitely repeat at the start and end of the diagram, we use $-\bar{1}$ or $\bar{1}$; we then omit the ellipses. Additionally, we put a vertical bar between where the main diagonal of the Young diagram splits our Maya diagram.

Thus, our text-based Maya diagram becomes:

$$\bar{1}, -1, -1, 1, -1|1, 1, -1, 1, -\bar{1}$$

Although a text-based representation is often sufficient, we can also create a visual Maya diagram.

The easiest way to make such a visual is to rotate our (English/Matrix-style) Young diagram 45° to the right, and extend it in the following fashion:

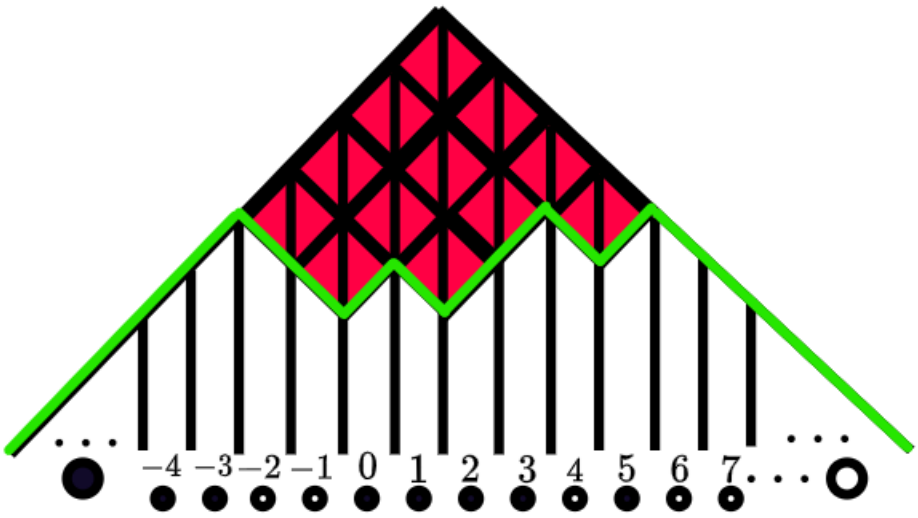


The section labeled in green shows the main part of the diagram; the rest is just to help us construct the diagram. After drawing the vertical lines as shown in the diagram, we place 0 in the slot directly after the apex of the Young diagram, and count up by 1 each slot to its right, and down by 1 each slot to its left.

Additionally, instead of using the -1 and 1 notation as we did in the text-based variation, we instead use a *filled circle* to represent when the green line is *increasing* and an *unfilled circle* when the green line is *decreasing*.

Our above diagram is called an *excited-state, 0-charge Maya diagram*. It is called *excited-state*, since it is not *ground-state*, in the sense that it is not based on a null Young diagram. Below, we introduce the concept of *charge*.

We can easily introduce a *charge*, denoted c, for a Maya diagram diagram, by shifting each of the number labels in our diagram by c. Given a charge of $c = 2$, the Maya diagram now becomes the following:



This diagram is now an *excited-state, charge-2 Maya diagram*. We note that each number label has increased by 2, and now, the apex of the Young diagram lies between 1 and 2, instead of -1 and 0 in the 0-charge variation.