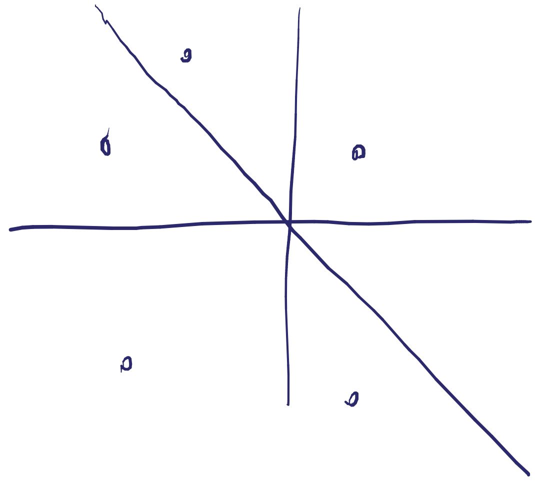
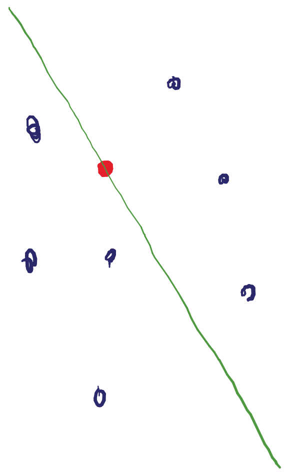
$\mathcal{A}_0$ contains all half planes whose boundary contains the origin. Each line $ax+by=0$ defines two dychotomies



(one for $ax+by\geq 0$, another for $ax+by\leq 0$)

By rotating the line, the dychotomy only changes if a point is crossed. In total, one obtains $2n$ dychotomies (if the points are in general position), so $S_{\mathcal{A}_0}(n)=2n$.

To determine $S_{\mathcal{A}}(n)$, we proceed by induction.



Suppose we fix $n-1$ points in general position so that $S_{\mathcal{A}}(n-1)$ dychotomies is realized.

Now add the n-th point.

Each dychotomy of the $n-1$ points gives rise to one on n points except for those that are realized by a line containing the new point.

By the first part of the exercise, there are $2(n-1)$ of these. Thus, $S_{\mathcal{A}}(n)=S_{\mathcal{A}}(n-1)+2(n-1)$

Since $S_{\mathcal{A}}(1)=2$, we obtain

$$S_{\mathcal{A}}(n)=S_{\mathcal{A}}(n-1)+2(n-1)=S_{\mathcal{A}}(n-2)+2((n-1)+(n-2))=\dots=2+2\sum_{i=1}^{n-1} i=\underline{\underline{n^2-n+2}}$$