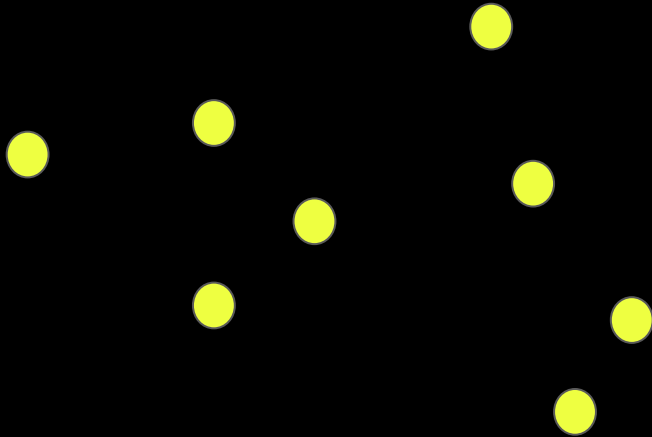
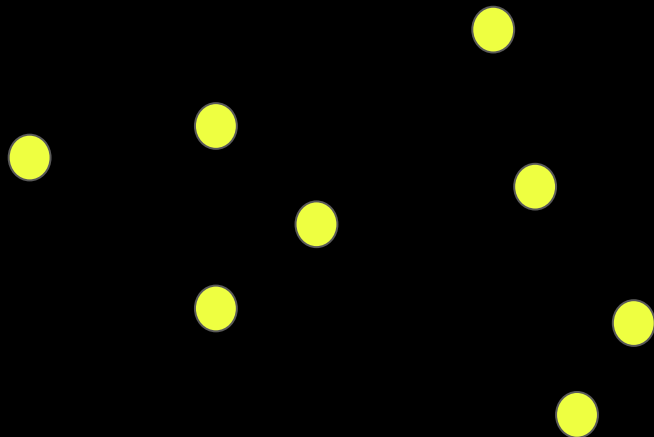


Voronoi Diagrams



Point Sets

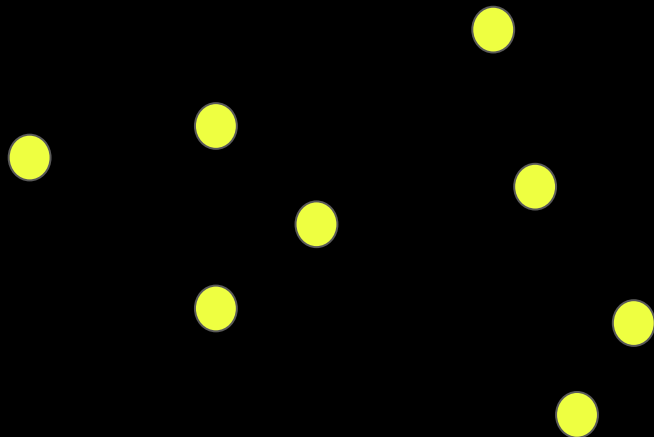
- Point sets are just collections of points on the plane.



- This idea is so simple!
- How could it have any interesting implications??

Point Sets

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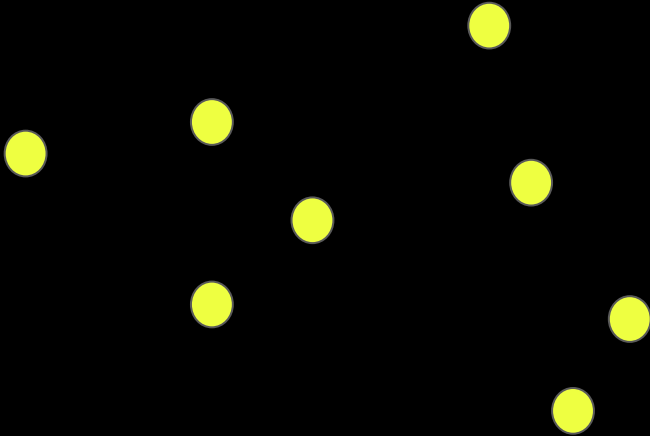


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A point set

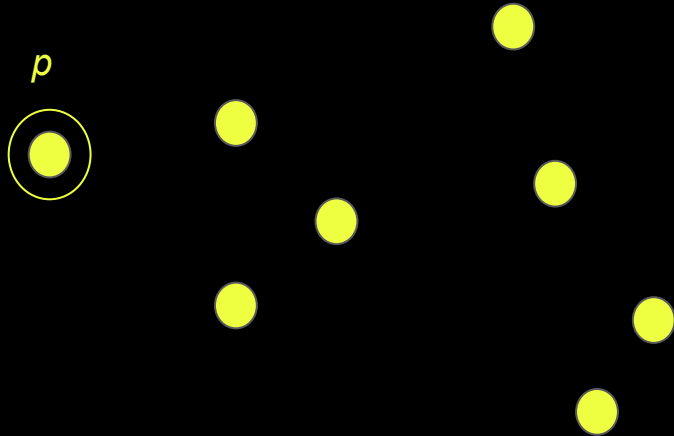
Voronoi Diagrams: what they are

- Suppose we have some point set

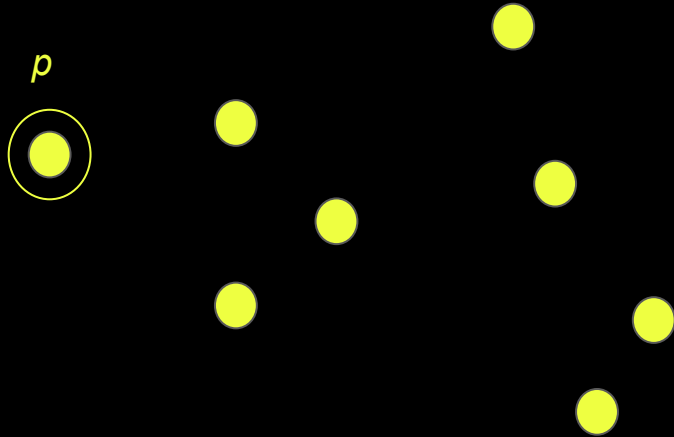


Voronoi Diagrams: what they are

- Suppose we have some point set
- Suppose I select some point, and call it p



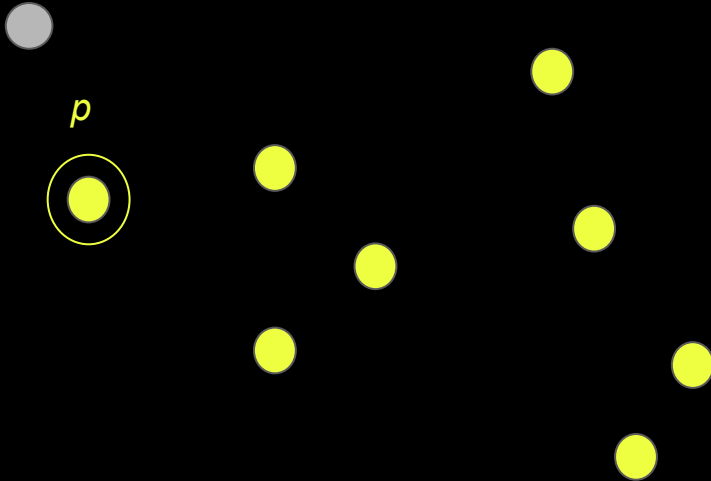
Voronoi Diagrams: what they are



- Suppose we have some point set
- Suppose I select some point, and call it p
- The *Voronoi cell* of p is the region of the plane where every point is *closer* to p than to any other point

Voronoi Diagrams: what they are

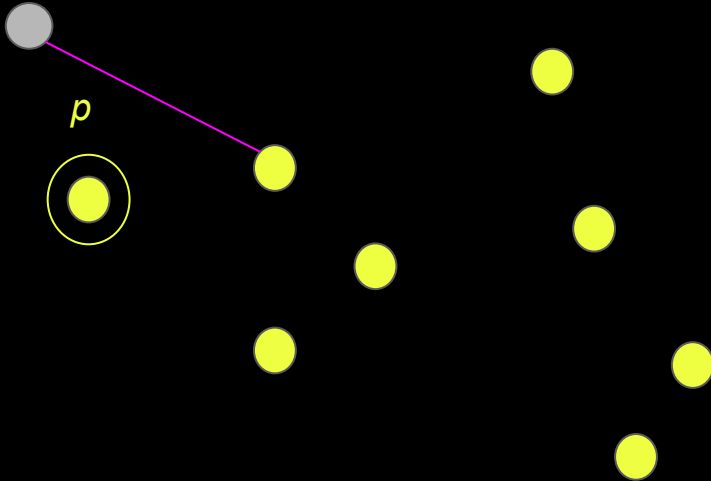
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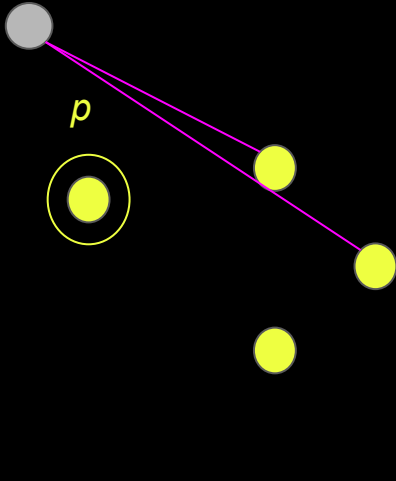
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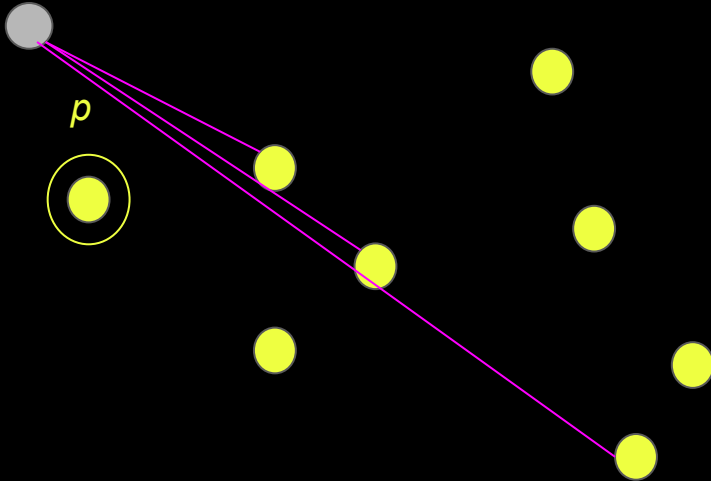
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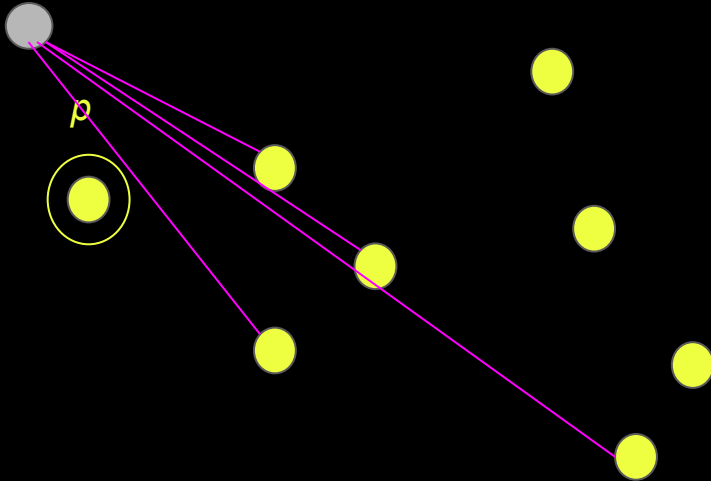
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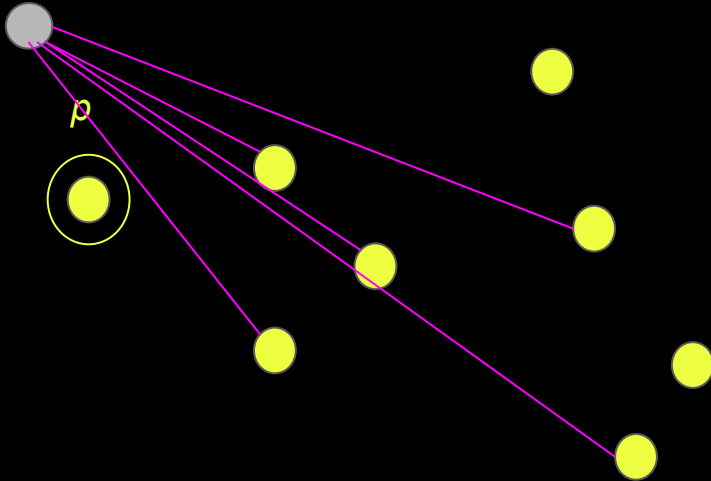
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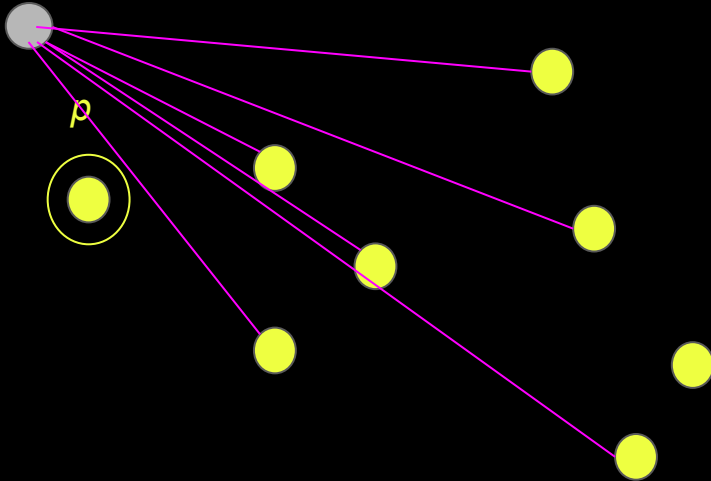
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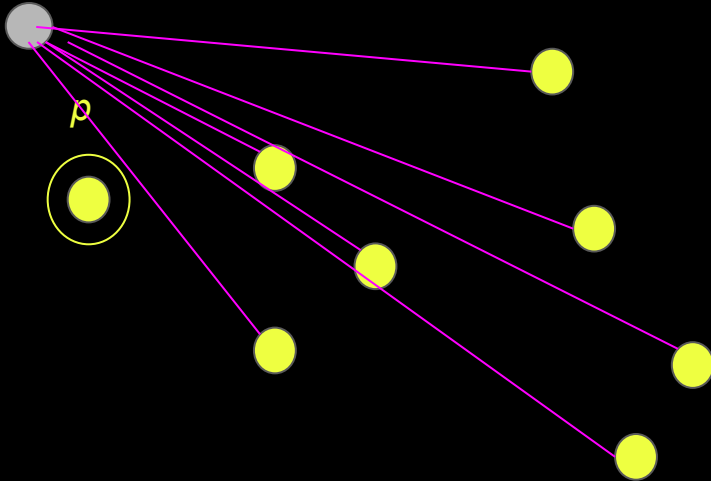
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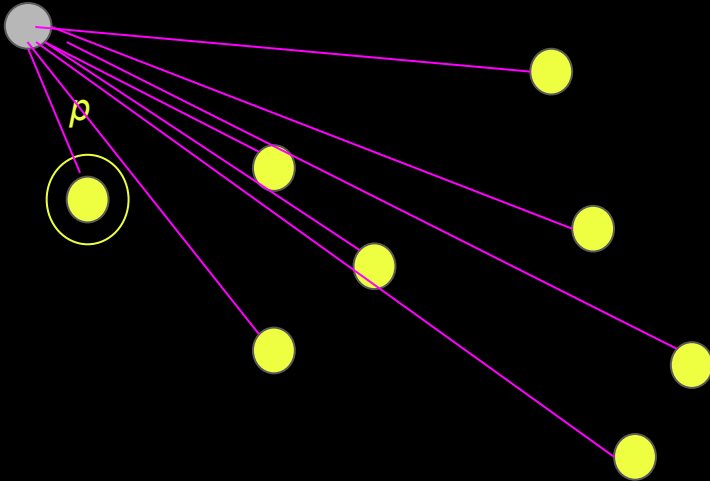
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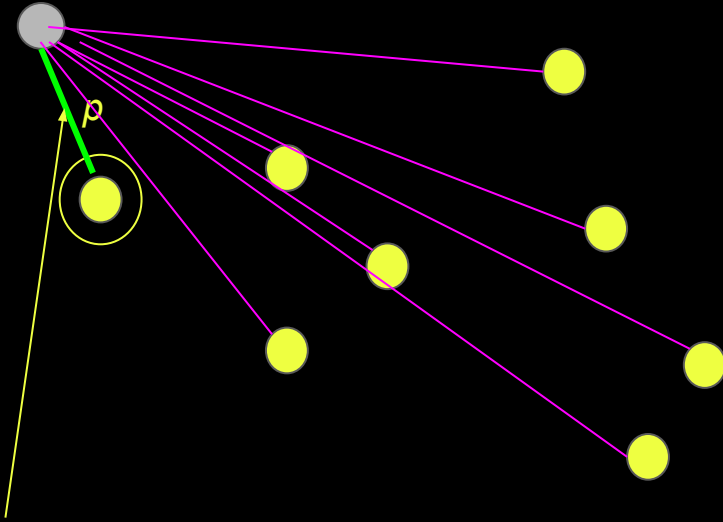
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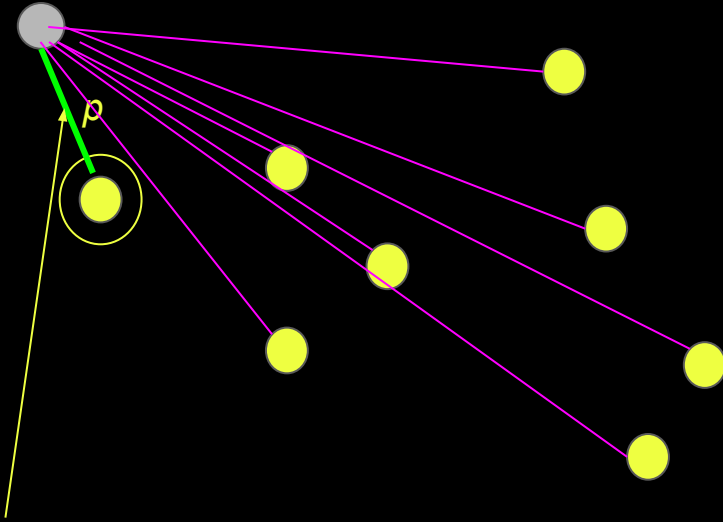
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Notice that the shortest line segment is the one that goes to p . So the point is *closest* to p

Voronoi Diagrams: what they are

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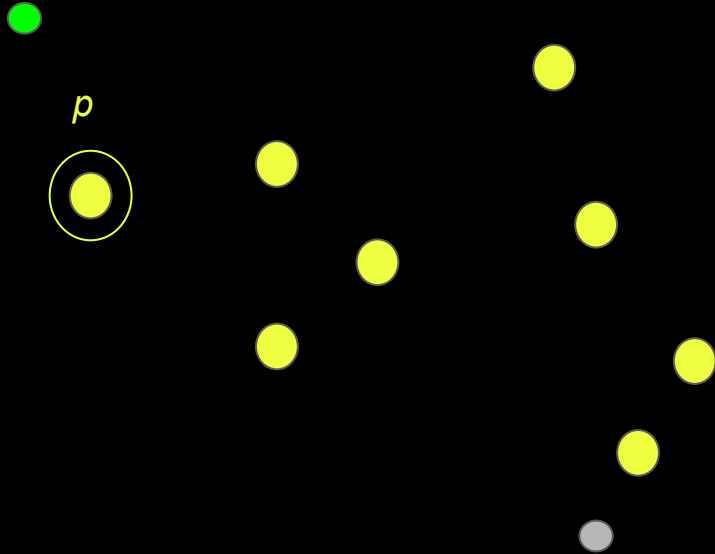
YES!!



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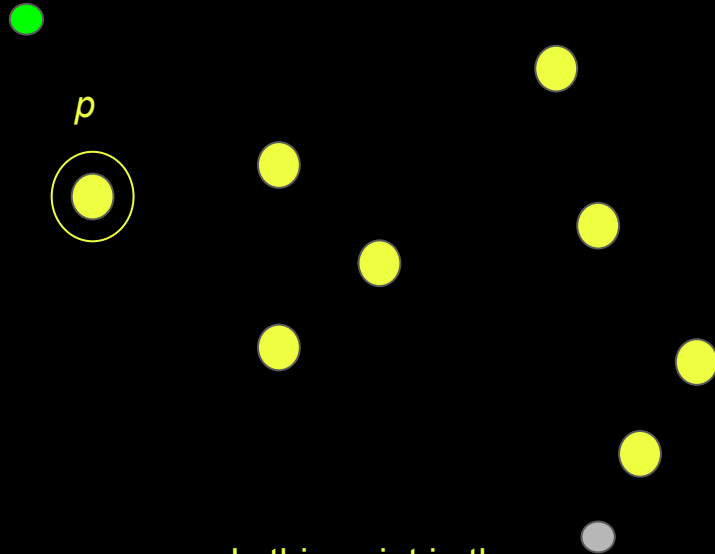
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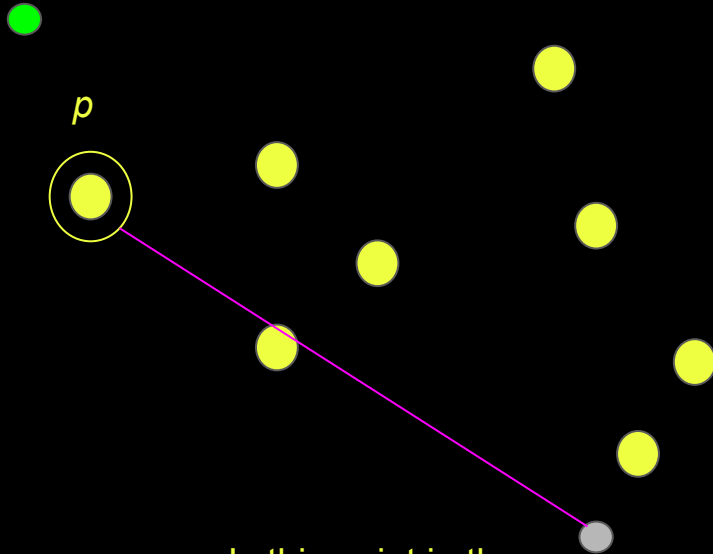
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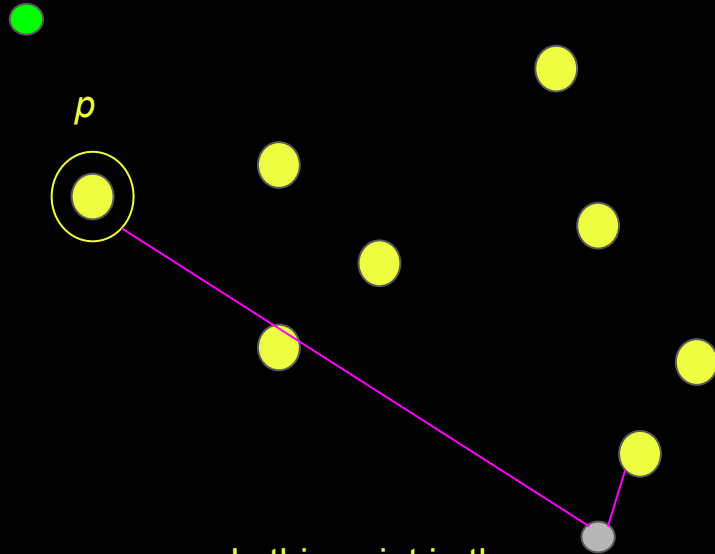
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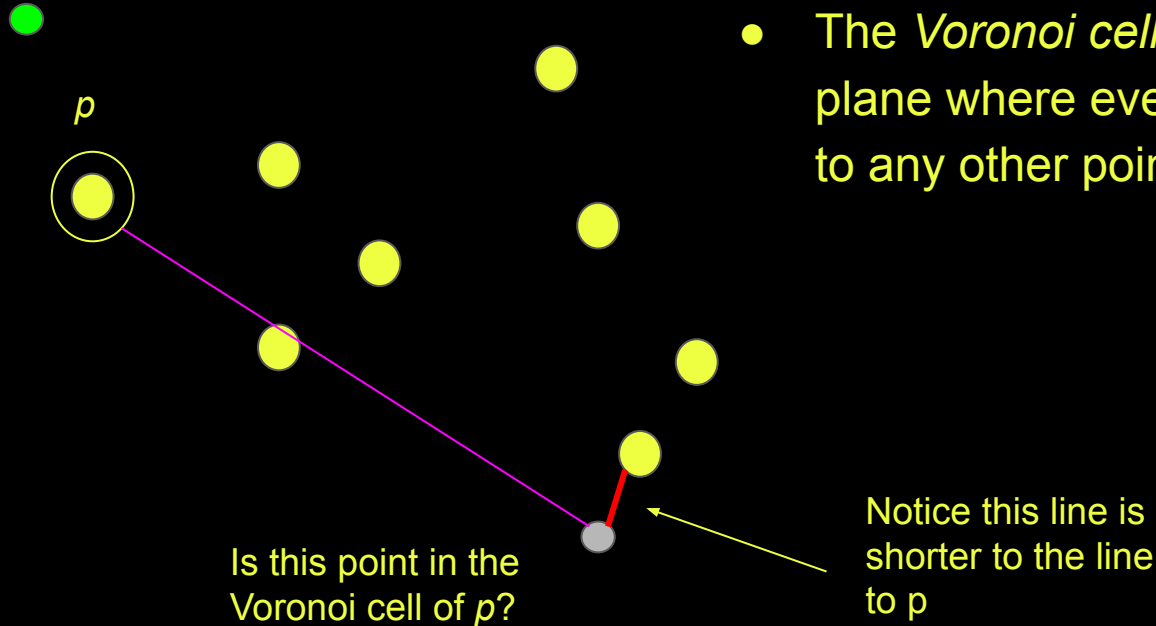


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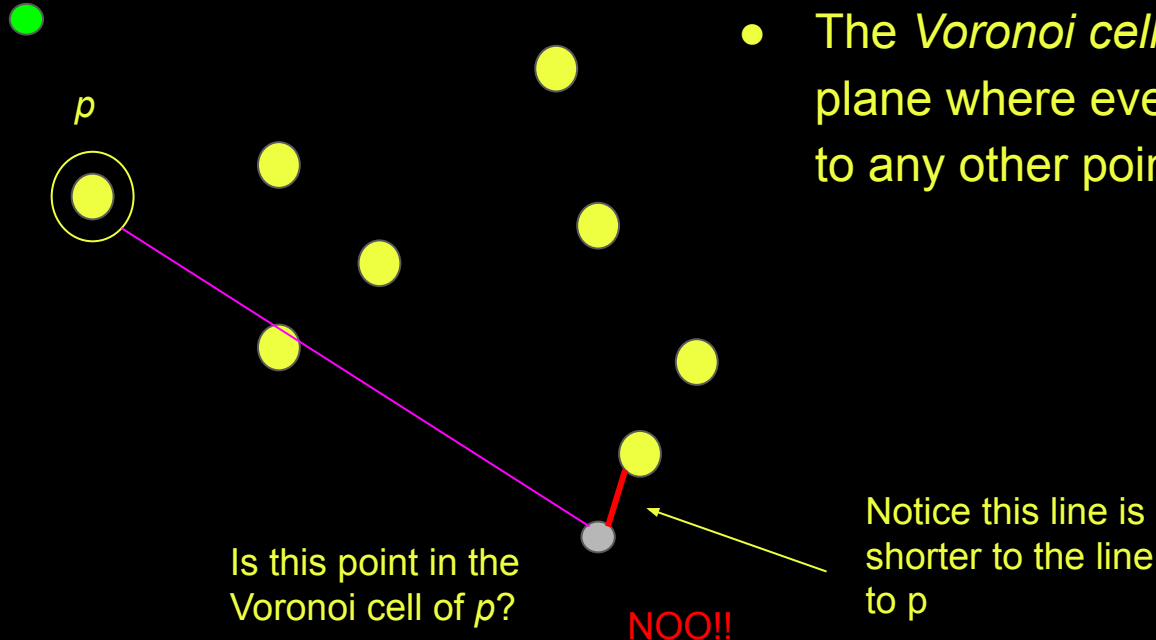
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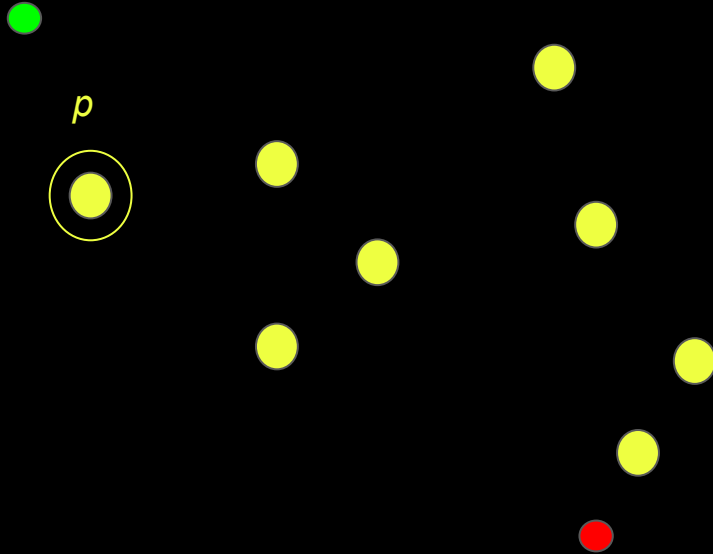


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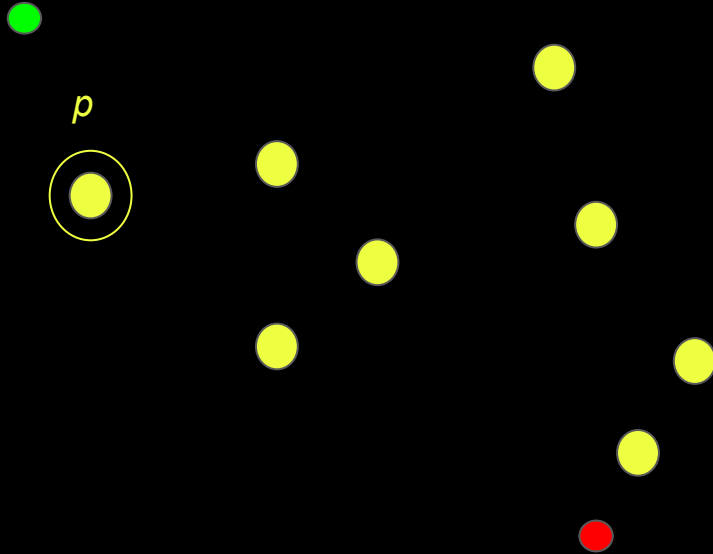


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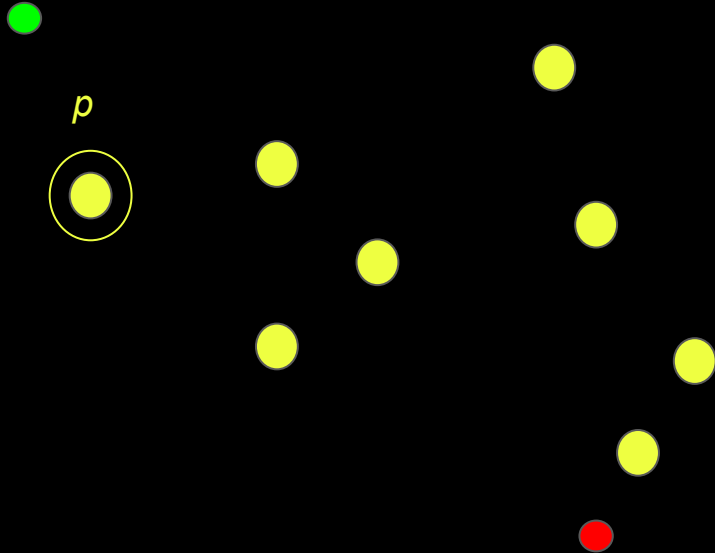
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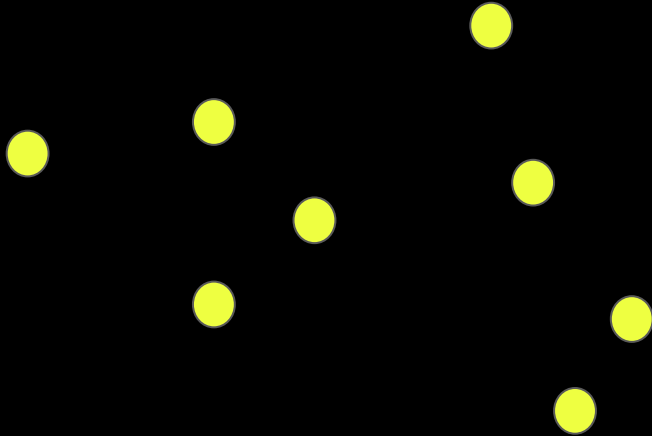
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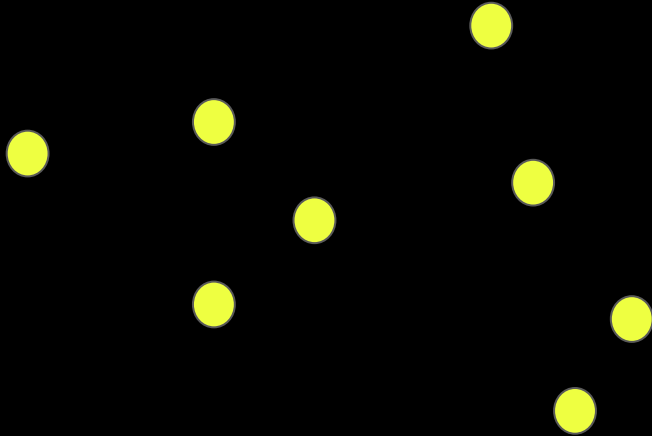


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- It is the set of points where you cross over from one Voronoi cell to another

What do Voronoi diagrams of point sets look like??



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What do yall think?

Like this!

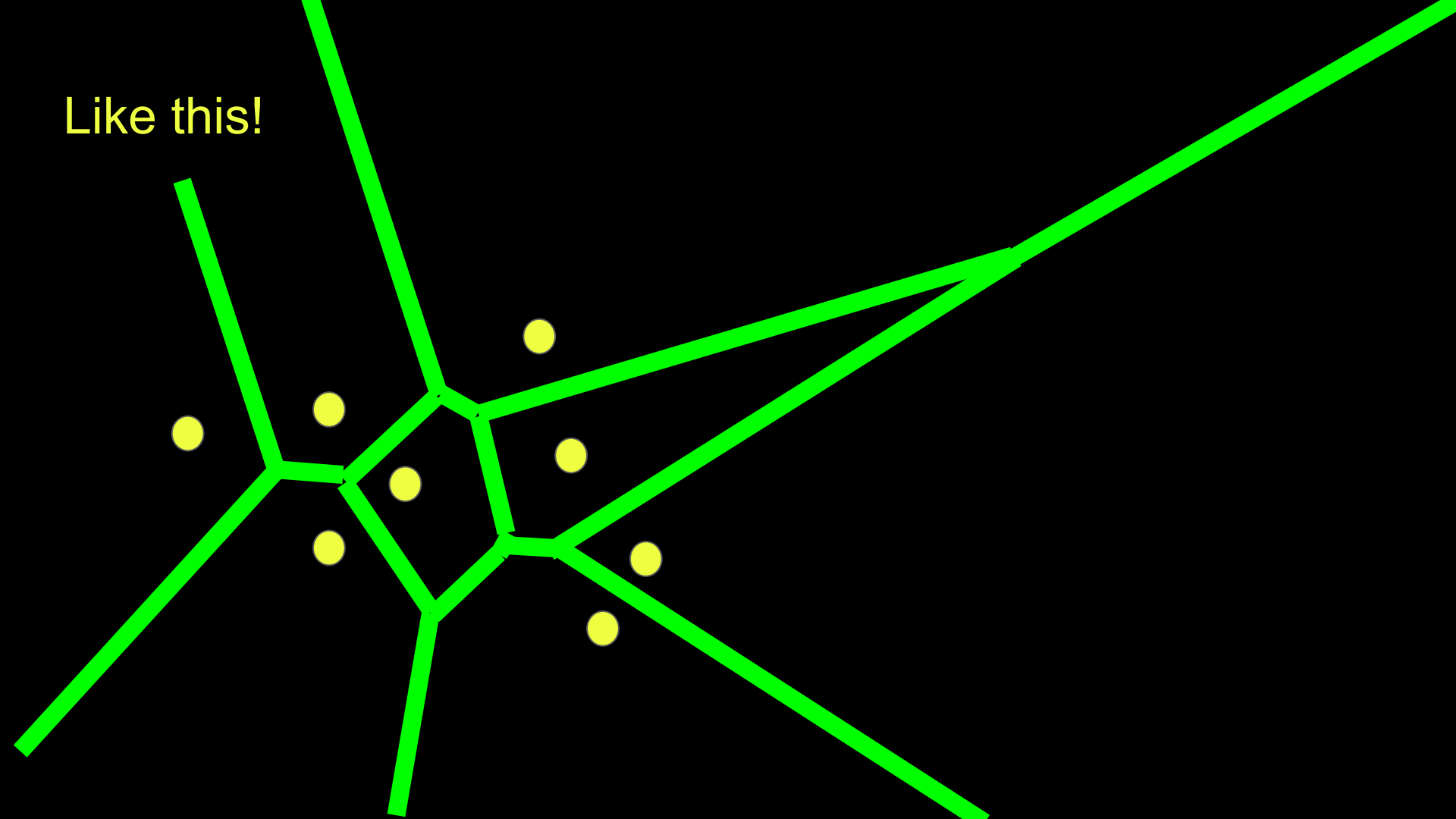
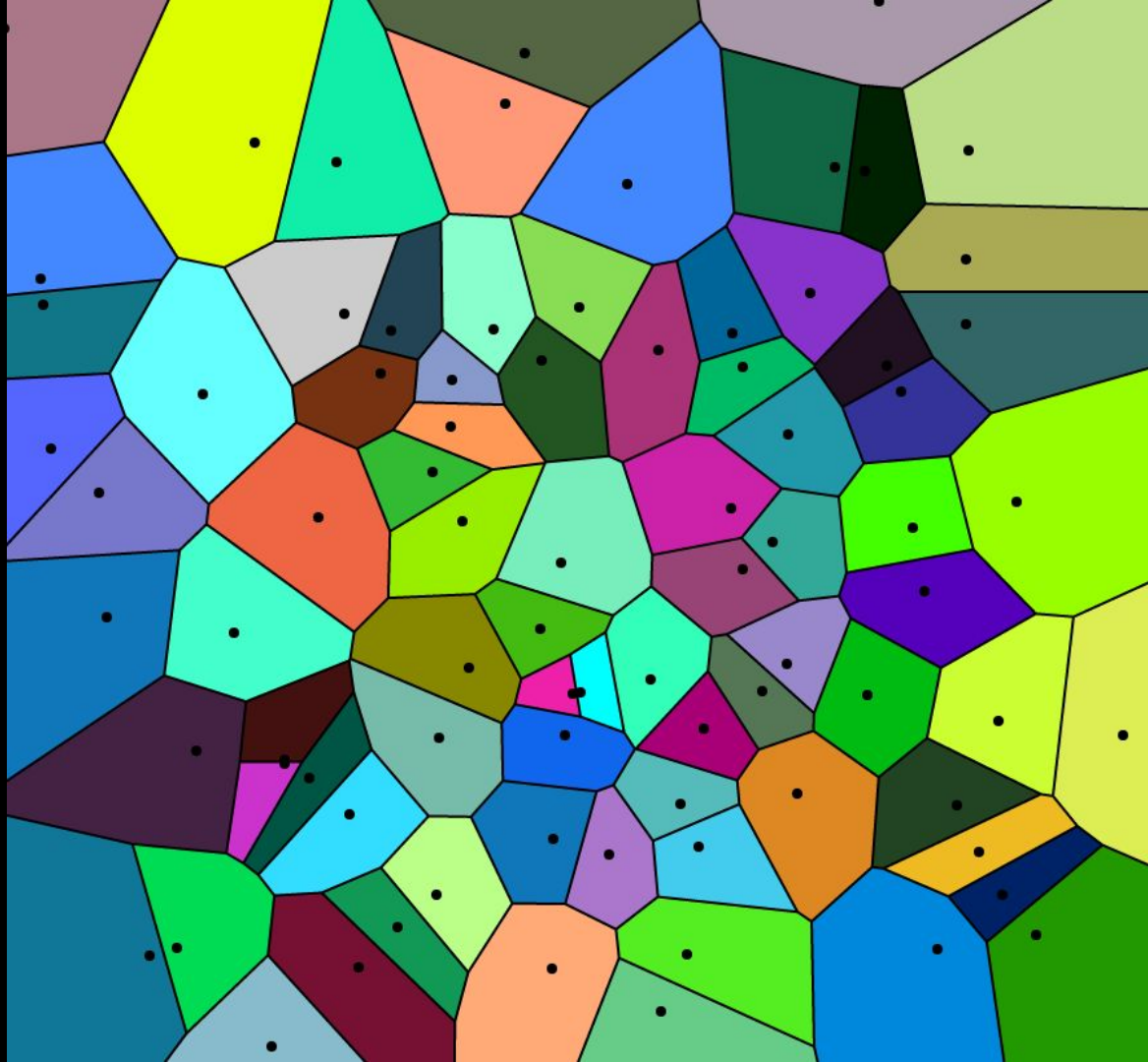


Image thanks to:

[https://cfbrasz.github.io/
Voronoi.html](https://cfbrasz.github.io/Voronoi.html)

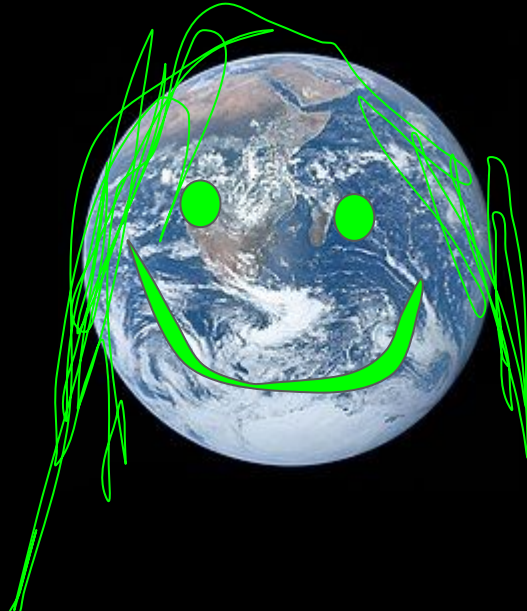


Voronoi Diagrams in Nature

- Not only do mathematicians like Voronoi diagrams, so does Mother Nature
- Voronoi diagrams show up everywhere in nature!

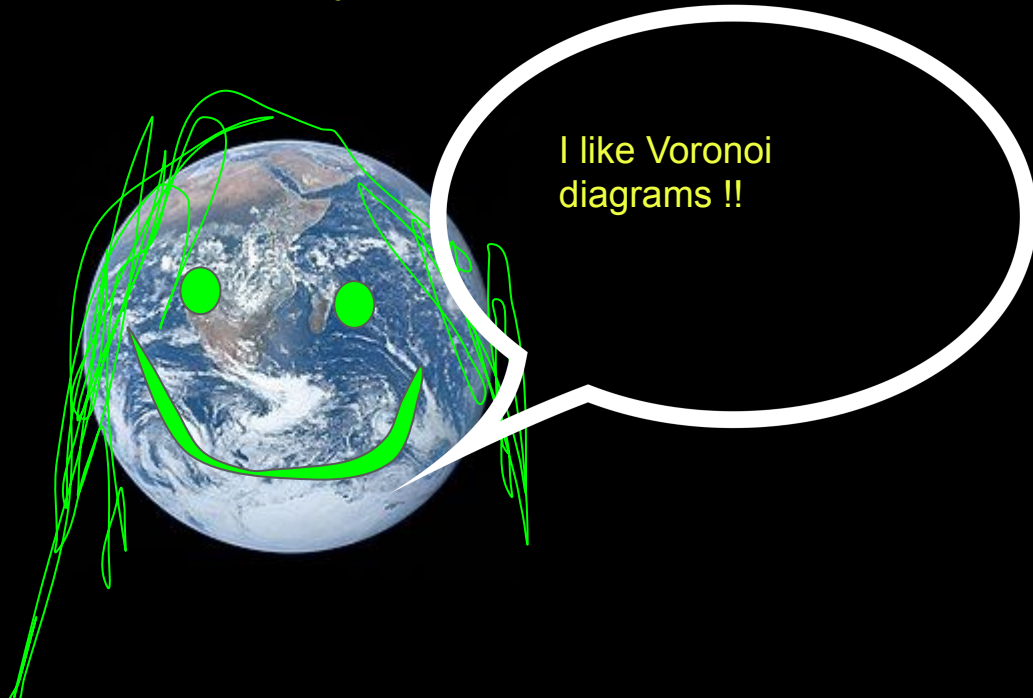
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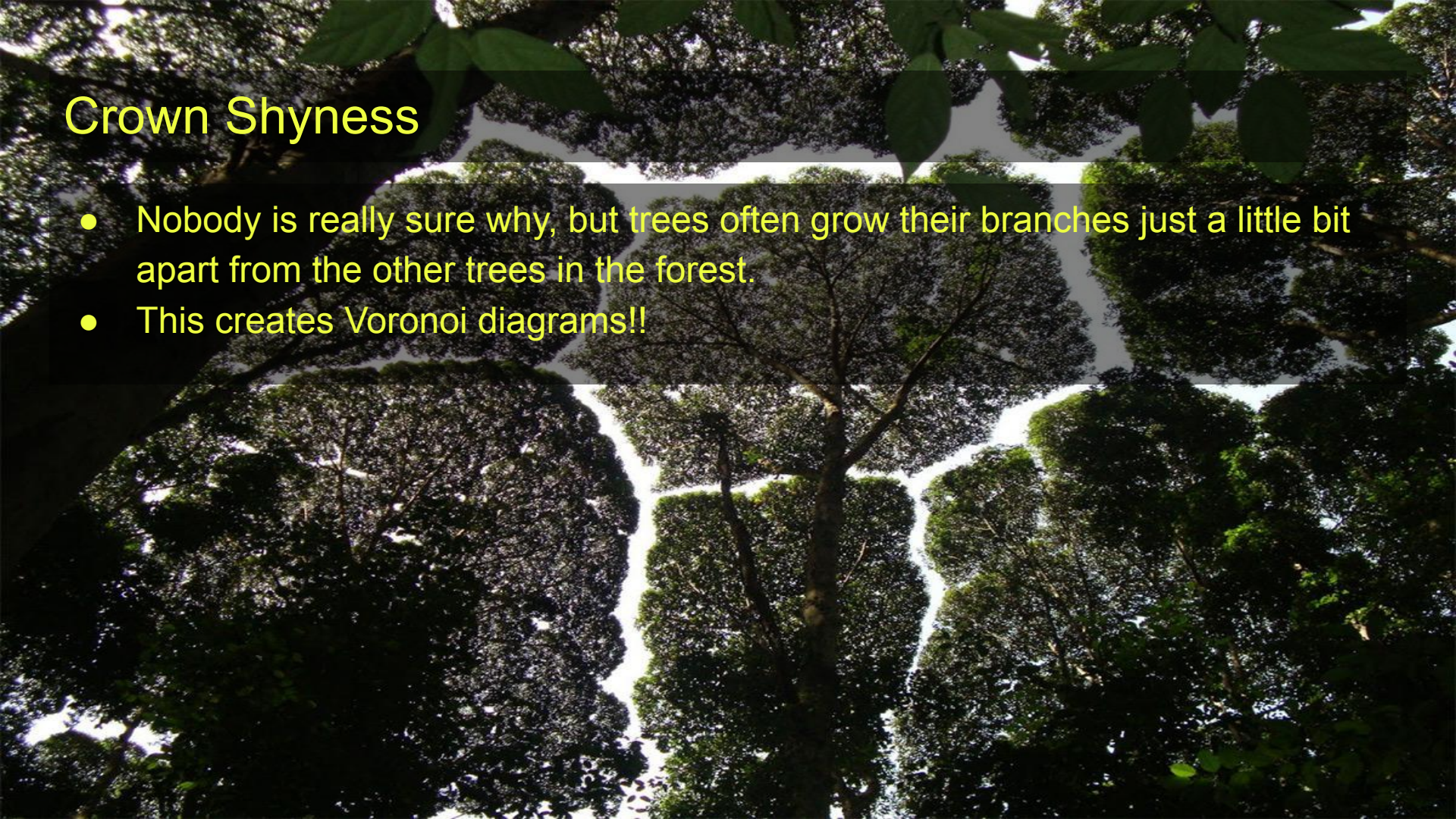
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Crown Shyness

- Nobody is really sure why, but trees often grow their branches just a little bit apart from the other trees in the forest.
- This creates Voronoi diagrams!!







Leaves



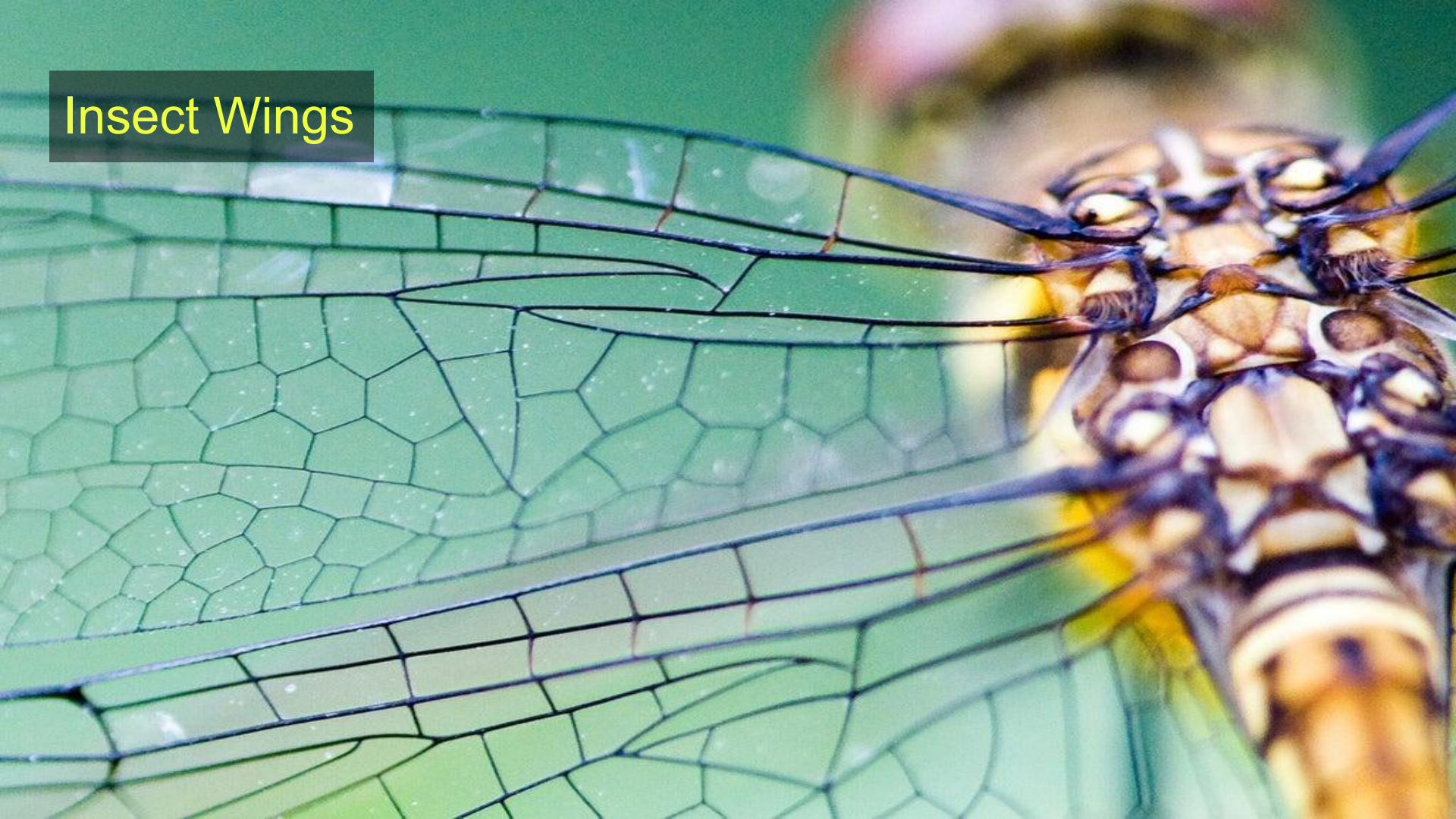


Giraffes and patterns on animal fur





Insect Wings





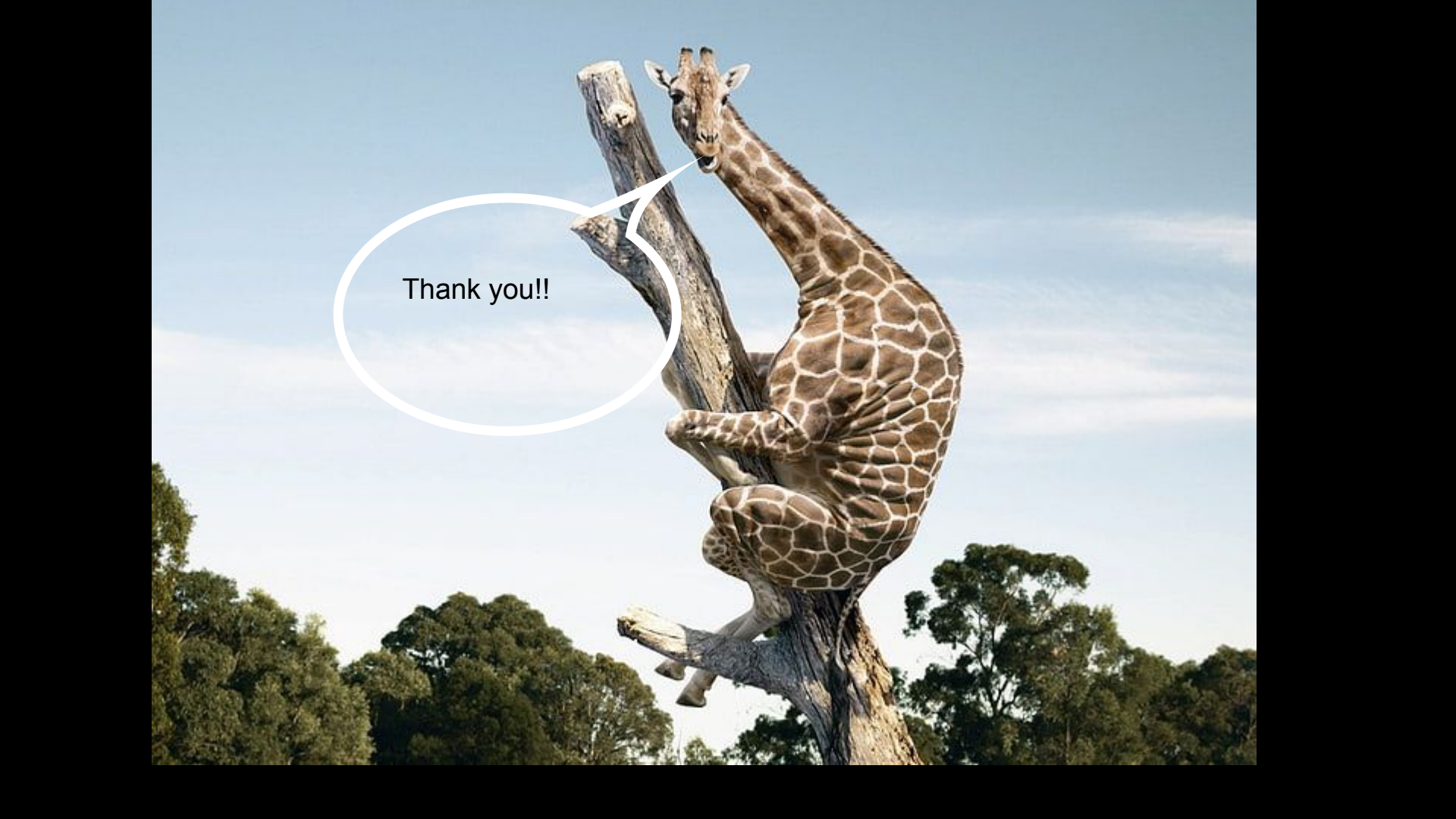
Most importantly, turtle shells!





Now you'll make your own Voronoi diagrams!!

- For the last ten or so minutes, have fun with a relaxing art project on Voronoi diagrams.
- Hopefully, this will help you get a sense of why Voronoi diagrams appear in nature as well!

A giraffe is shown climbing a large, weathered tree trunk. The giraffe is positioned vertically, with its front legs hooked over the trunk and its hind legs pushing off. Its head is tilted back, and its mouth is open as if it is speaking. A white speech bubble with a black outline is positioned to the left of the giraffe's head, containing the text "Thank you!!". The background consists of a clear blue sky with some light clouds and a line of green trees at the bottom.

Thank you!!