How to decide what to use

We can use some very wide ones or some very narrow ones. This is a hyperparameter that we tune during training and it is called the **gamma parameter**.

- A large gamma will move us to a narrow curve
- A small gamma would give us a wide curve

In higher dimensions, this is very similar.

- A large gamma will give us some pointy mountains
- A small gamma would give us wider mountains

The gamma matters a lot in the algorithm. Large values of gamma tend to overfit, and small ones tend to underfit.

What is Gamma?

Well, here's where we define these radial basis functions. We'll use the Gaussian or normal distribution for this.

In the general case, when mu is the very center of the curve, and sigma is related to its width, we have these rules of thumb:

- If sigma is large, then the curve is very wide
- if sigma is small, then the curve is very narrow

So in order to define **gamma**, we just use

$\gamma = 1 / 2\sigma \hat{} 2$

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And keep in mind

- if gamma is large, then sigma is small, so the curve is narrow
- If gamma is small, then sigma is large and the curve is wide

In the higher dimensional case, this formula becomes a little more complicated. But as long as we think of gamma as some parameter that is associated with the width of the curve in an inverse way, then we are grasping the concept of the gamma parameter and the RBF kernel.

Quiz Question

Which of the following are true about 'Gamma' (There may be more than one correct answer)

a. if gamma is large, then sigma is large, so the curve is narrow
b. If gamma is small, then sigma is small and the curve is wide
c. If gamma is small, then sigma is large and the curve is wide
d. if gamma is large, then sigma is small, so the curve is narrow