2.3

We know from the lecture that . Then in our case, we need to calculate such that for , , which gives us:

In our case, , we have , and thus has to be at least 3768.

2.4b

We can show that any spherical classifier in dimension could be reduced to a linear classifier in dimension. Therefore, since we know the result that linear classifier in dimension has the VC-Dimension of , and spherical classifier in dimension is simply a special case for the general linear classifier in dimensions, we can conclude that spherical classifier in dimension has the VC-Dimension no more than , which is the desired result.

To show we can reduce the spherical classifier with dimension , we essentially need to find , such that , where for all .

Expand the value in the left hand side, we have:

Since we have the freedom of choosing the transformation function that converts into in dimension, we could simply pick such that for , and for . Thus, the original left hand side becomes:

Then, if we denote , for and for , we realize immediately that:

Thus, we successfully constructed such that the result of the resulting dimensional linear classifier is the same as the dimensional spherical classifier given.

Since we could reduce any spherical classifier in dimension to a linear classifier in dimension, following the argument given in the beginning of the setup, we know that the VC-Dimension of dimension spherical classifier cannot be more than .