Exercises for Lecture 3

1. Curse of dimensionality (Bishop, pg. 36)

Consider a sphere with radius $r = 1$ in D dimensions. Show that the ratio of the volume of the shell from radius $r = 1 - \epsilon$ to $r = 1$ to the volume of the whole sphere is given by $1 - (1 - \epsilon)^D$, which goes to 1 as $D \to \infty$.