Here, I have used a simple simulation to show that a random walker starting from the origin in a tetrahedral lattice will never return. In the attachment, you can find two MATLAB files, one for generating N-step random walkers in a tetrahedral lattice (*Randomwalks3d.m*), and the other one for getting the probabilities (*probR.m*).

After generetaing 10000 number of 100-step random walker in the code *Randomwalks3d.m*, the code *probR.m* calculates the position of each random walker in their last step. So, we have a distribution of position of random walks in a 3D coordinate system. We can easily get the number of random walkers in different radii and from that we can obtain the probability of having random walkers inside different radii. Figure 0.1 shows this probability agains radius. We can see that this probability is zero for $r < 4$ which means that the walkers never return to the origin. The figure also shows that the probability increases with radius and becomes constant ($p = 1$) after $r \simeq 40$.

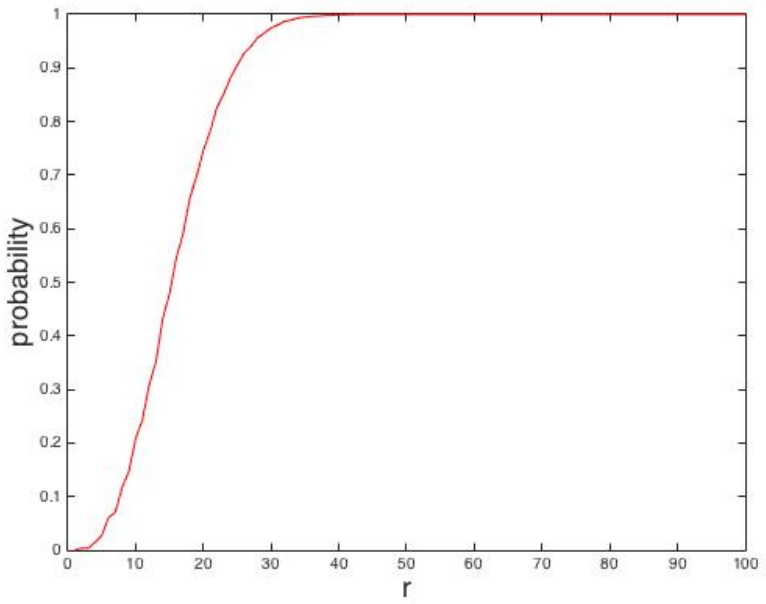


Figure 0.1: Probability of having random walkers in different radii.