Physics 4321/7305 Professor Scalise
Homework Assignment #11 Spring 2020

# 4321

1. Suppose that in Sherwood Forest, the average radius of a tree is $R = 1$ m and the average number of trees per unit area is $\Sigma = 0.005$ m$^{-2}$. If Robin Hood shoots an arrow in a random direction, how far, on average, will it travel before it strikes a tree?

   (a) Find the solution theoretically on paper, listing all the steps and assumptions.

   (b) Verify your answer with Monte Carlo computer code. Use any language that you like. Make sure that you shoot enough arrows in enough forests. Turn in the code electronically. Also turn in some runs, showing the code working and producing output.

# 7305

1. Suppose you are in an infinitely large, infinitely old universe in which the average density of stars is $n = 10^9$ Mpc$^{-3}$ and the average stellar radius is equal to the Sun's radius $R_\odot = 7 \times 10^8$ m. How far, on average, could you see in any direction before your line of sight struck a star? (Assume standard Euclidean geometry holds true in this universe.)

   (a) Find the solution theoretically on paper, listing all the steps and assumptions.

   (b) Verify your answer with Monte Carlo computer code. Use any language that you like. Make sure that you shoot enough lines in enough universes. Turn in the code electronically. Also turn in some runs, showing the code working and producing output.

**Bonus:** Solve as much of the other class' assignment as you can.