Physics 596 – Fall 2022

Fermi Problems #5

Solve, as a group, the following Fermi problems: No handbooks, calculators, or computers allowed!

(1). If a star roughly 10 times the mass of our sun and 30 light years away from earth went supernova, distributing most of its mass uniformly in all directions, how much of its mass would be distributed on the earth? How about in the area in which you're sitting? ($M_{sun} = 2$ x 10^{30} kg and $R_{earth} = 6$ x 10^6 m)

(2). According to biology textbooks, there is roughly 1 meter of DNA in each cell of the human body. How far would all the DNA in your body stretch? Compare this to the distance between the earth and sun.

(3). What is the power output of the human body in Watts? How does this compare to the power output of a typical lightbulb?