Prof. Girod

Birds independently land on an infinitely long telegraph wire at random positions. Each bird has a right neigbor and a left neighbor. The distance Δ between neighboring birds is exponentially distributed according to the pdf $f_\Delta(\Delta) = e^{-\Delta}$ for $\Delta \geq 0$.

(a) What is the pdf of the distance between a bird and its nearest neighbor?

(b) If bird B' is the nearest neighbor of B, what is the probability that B is also the nearest neighbor of B'?

(c) Paint the interval between B and its nearest neighbor B' yellow. If we do this for each bird B, what fraction of the real line will be painted yellow?