[2] (25 points) A particle of mass m and charge q is initially at rest with velocity $v_A = 0$. It is hit head on (i.e. motion is restricted to one dimension) by another particle with the same mass and charge traveling at velocity $v_B = v$.

a) What is the initial energy E_i and momentum p_i of the system (when the particles are far apart)?

b) What is the energy E_s and momentum p_s of the system when the particles are separated by a small distance r?

c) What is the classical minimum approach distance between the two particle in terms of the initial velocity v? (Hint: at the min. distance their relative velocity is zero.)