Problem 8. Elastic collision ***(7 points)***

Consider a perfectly elastic collision of two balls, one of which has mass M and is moving with velocity v. The other has mass $m \leq M$ and stays initially at rest. The collision is not necessarily central. The surface of the balls is slippery, so the balls will not rotate.

i. (1 pt) What are the momenta of the balls before the collision in the frame of reference where the centre of mass of the whole system stays at rest?

ii. (3 pts) What are the momenta of the balls (by moduli) after the collision in the mass centre's frame of reference?

iii. (3 pts) What is the maximal angle α by which the trajectory of the initially moving ball can be inclined as a result of the collision?