2D Collisions Practice

1. Two rubber spheres approach each other as shown in the figure, where m =2.0kg, M= 4.0kg, v= 3 m/s and V = 5.0 m/s. If the rubber spheres collide and stick together at the origin,
   a) What are the x and y components of the velocity v' of the balls after the collision?
   b) What is the magnitude of the velocity v'?
   c) What is the angle θ?
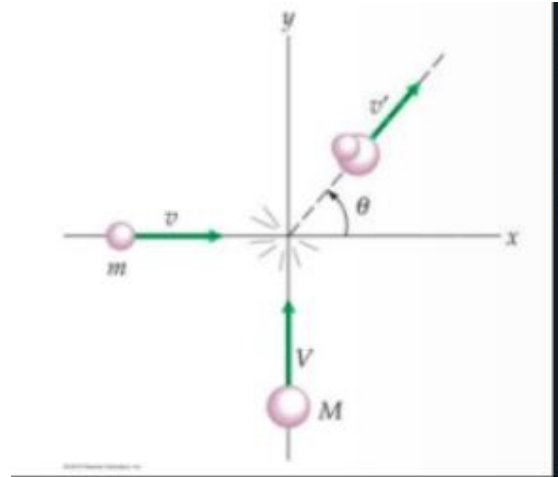
2. A hokey puck of mass 0.15 kg moves on a frictionless horizontal surface with a speed of 3.5 m/s west. It has a glancing collision with another puck initially stationary) of a mass 0.2 kg. After the collision the first puck moves north while the second puck moves 25 ^{0} south of west.
   a) What is the magnitude of the initial momentums x component?
   b) Using this, determine the magnitude of the velocity of the puck that was originally at rest after the collision.
   c) What is the magnitude of the initial momentums y component?
   d) Using this, determine the magnitude of the velocity of original puck after the collision.

3. A 40 kg coconut is filled with lit firecrackers. Once the firecrackers explode, the coconut explodes into 3 pieces. A 20 kg piece flies directly north at 200 m/s and another 10 kg piece flies directly east at 150 m/s. What is the veloctity (magnitude and direction) of the remaining 10 kg piece?

4. A 1000 kg car moving west at 10 m/s collides inelastically with a 2000 kg SUV that was moving 9 m/s south. What velocity (magnitude and direction) would the vehicles have immediately after the collision while they are stuck together?