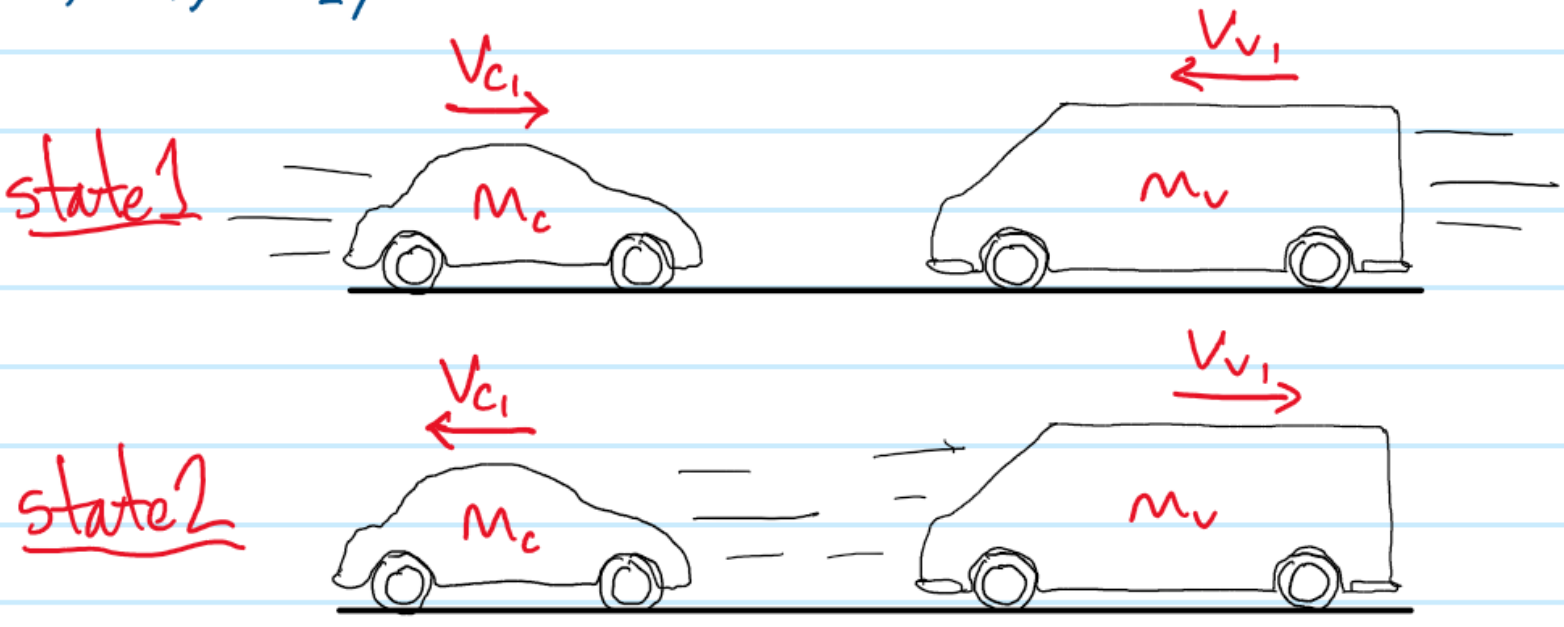
21-P-MOM-GD-003

A m_c kg car is travelling to the right at V_{c_1} m/s, while a m_v kg van is travelling to the left at V_{v_1} m/s. What is the car's speed after they collide and rebound if the van moves to the right at V_{v_2} m/s? If the two vehicles touch for t s, what is the magnitude of the average impulse force between them?

(Assume to the right is positive)

given $m_c, v_{c1}, m_v, v_{v1}, v_{v2}, t$

Find v_{c2}, F



Conservation of Linear Momentum

$$m_c v_{c1} + m_v v_{v1} = m_v v_{v2} + m_c v_{c2}$$

$$v_{c2} = \frac{m_c v_{c1} + m_v v_{v1} - m_v v_{v2}}{m_c}$$

Impulse and Momentum

$$m_c v_{c1} + \int \Sigma F \, dt = m_c v_{c2}$$

$$F = \left| \frac{m_c v_{c2} - m_c v_{c1}}{t} \right|$$