Algorithm

For all cars C

- Calculate relative dist $\vec{d}$
- Calculate relative velocity $\vec{v}_{cv}$
- If $\vec{v}\cdot\vec{d} > 0 \Rightarrow$ Car is not likely to hit v

  else if $\vec{v}\cdot\vec{d} < 0$

  $\Rightarrow$ Decision Parameter $\propto$ speed

  $\propto 1/\text{distance}$

$$\text{Decision Parameter} = \left| \frac{\vec{d}\cdot\vec{v}_{cv}}{|\vec{d}|^2} \right|$$

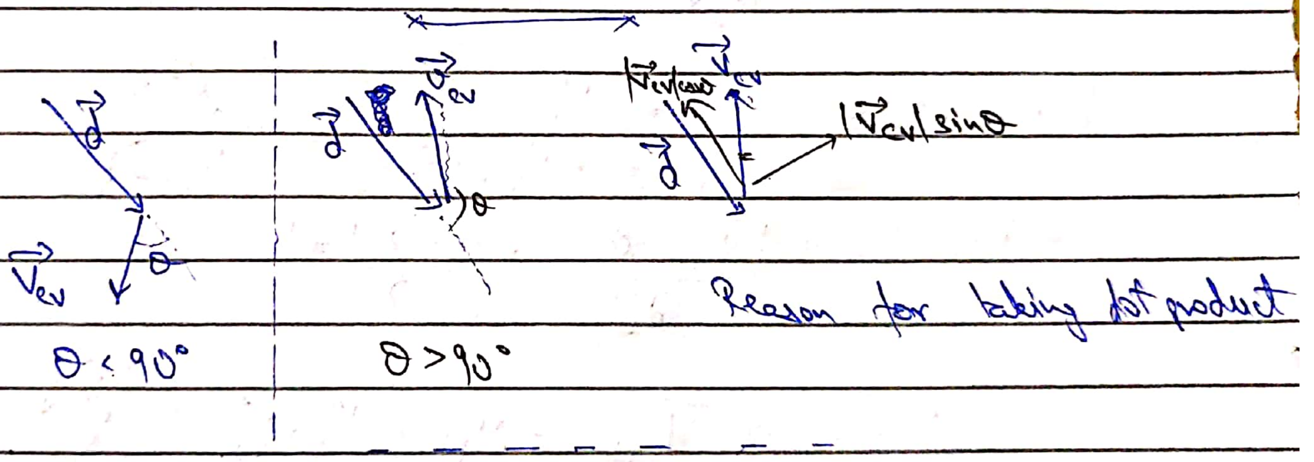
$$= \left| \frac{-|\vec{v}_{cv}|\cos\theta}{|\vec{d}|} \right|$$

Let car C_i have max value of decision parameter

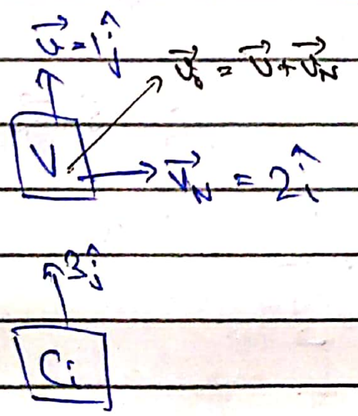
Let velocity of our vehicle be $\vec{v}$

Let $\vec{v}_N$ be normal to $\vec{v}_{cv}$

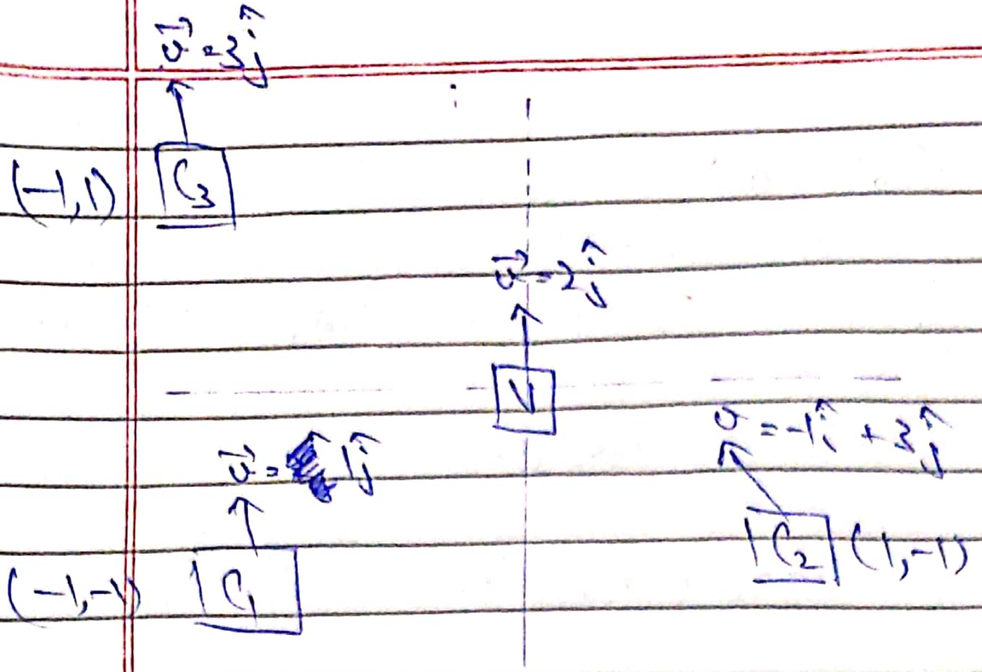
Output velocity, $\vec{v}_0 = \vec{v} + \vec{v}_N$



Reason for taking dot product



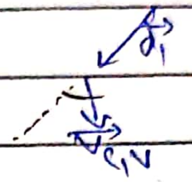
Reason for taking $\vec{v}_0 = \vec{v} + \vec{v}_N$



For C_1:- $\vec{d}_1 = -1\hat{i} - 1\hat{j}$

$\vec{V}_{C_1V} = 0\hat{i} - 1\hat{j}$

$\vec{d}_1 \cdot \vec{V}_{C_1V} > 0$

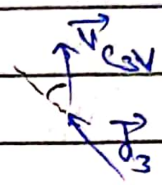


$\theta < 90$

For C_3:- $\vec{d}_3 = -1\hat{i} + 1\hat{j}$

$\vec{V}_{C_3V} = 0\hat{i} + 1\hat{j}$

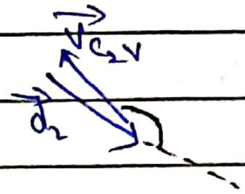
$\vec{d}_3 \cdot \vec{V}_{C_3V} > 0$



$\theta < 90$

For C_2:- $\vec{d}_2 = 1\hat{i} - 1\hat{j}$

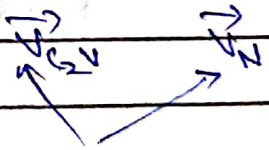
$\vec{V}_{C_2V} = -1\hat{i} + 1\hat{j}$



$\theta > 90$

$$\text{Parameter} = \left|\frac{\vec{V}_{C_2V} \cdot \vec{d}_2}{|\vec{d}_2|^2}\right| = \left|\frac{-2}{2}\right| = 1$$

Normal to $\vec{V}_{C_2V} = \vec{V}_N = 1\hat{i} + 1\hat{j}$



Output velocity $\vec{V}_0$