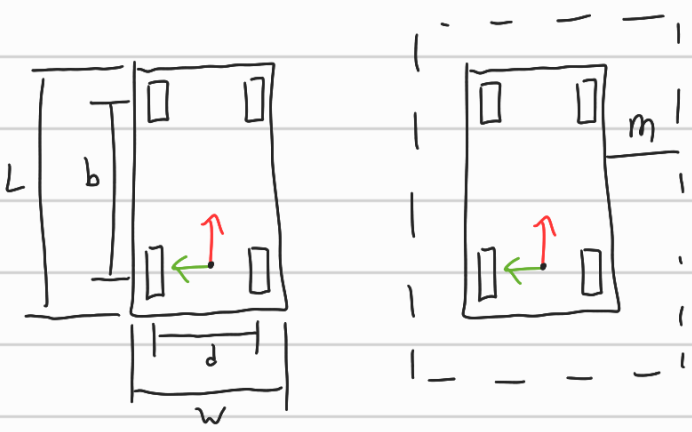
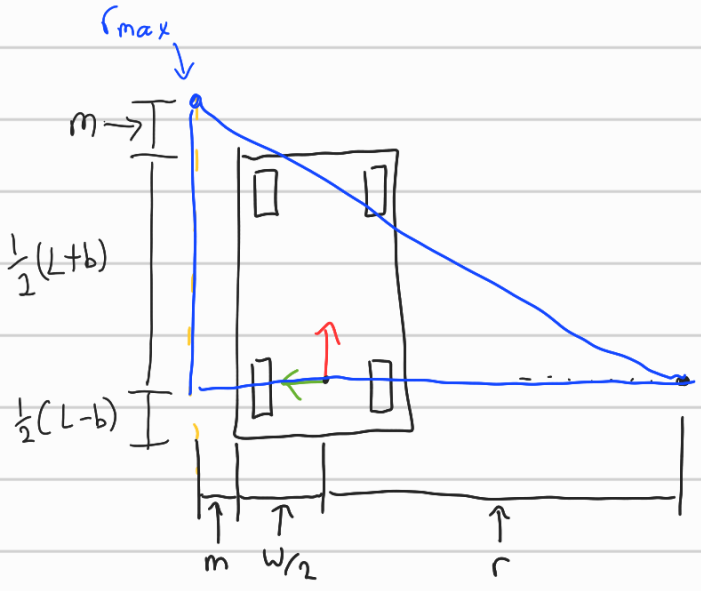
Questions

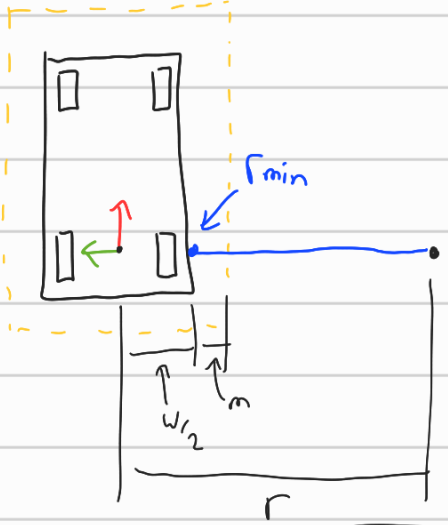


1)



$$r_{max} = \left[\left(r + w/2 + m\right)^2 + \left(\tfrac{1}{2}(L+b) + m\right)^2\right]^{1/2}$$

2)



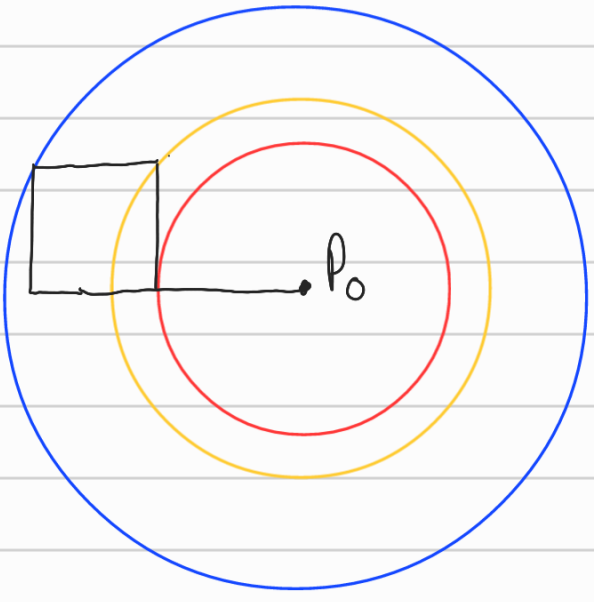
$$r_{min} = r - w/2 - m$$

3/4/5) $r_{min} = r - w/2 - m$

$r_{max} = \left[\left(r + w/2 + m\right)^2 + \left(\frac{1}{2}L + \frac{1}{2}b + m\right)^2\right]^{1/2}$

$r_b = \left[\left(r - w/2 - m\right)^2 + \left(\frac{1}{2}L + \frac{1}{2}b + m\right)^2\right]^{1/2}$

Let $r_p = \|P - P_0\|$



$r_p < r_{min}$:	No Collision
$r_{min} \le r_p < r_b$:	Side Collision
$r_b < r_p \le r_{max}$:	Front Collision
$r_p > r_{max}$:	No Collision

6) $r_p = \| P - P_0 \|$

if $((r_p < r_{min}) \,||\, (r_p > r_{max}))$

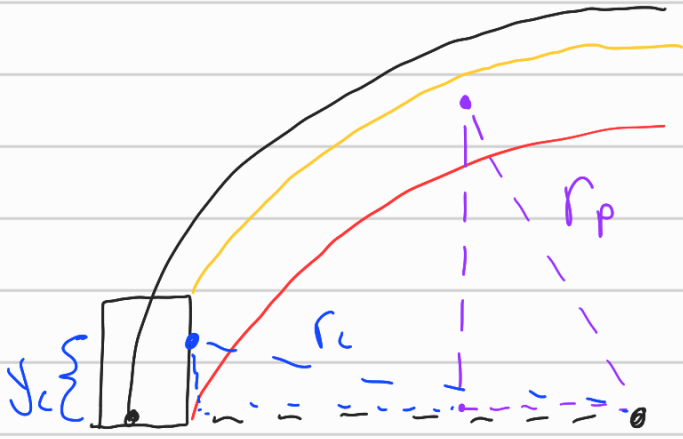
return max_dist // No collision, go as far as we want

else if $(r_p < r_b)$ // Side Collision

$r_{collision}^2 = r_p^2 = r_{min}^2 + y_c^2$

$y_c = [r_p^2 - r_{min}^2]^{1/2}$

$\emptyset_c = \tan^{-1}(y_c / r_{min})$



$\emptyset_p = \tan^{-1}\left(\frac{P_y - P_{oy}}{P_x - P_{ox}}\right)$

$S = r(\emptyset_p - \emptyset_c)$

return S

else // Front Collision, $r_b > r_b$

$r_{collision}^2 = r_p^2 = X_c^2 + \left(\frac{1}{2}(L+b) + m\right)^2$

$X_c = \left[r_p^2 - \left(\frac{1}{2}(L+b) + m\right)^2\right]^{1/2}$

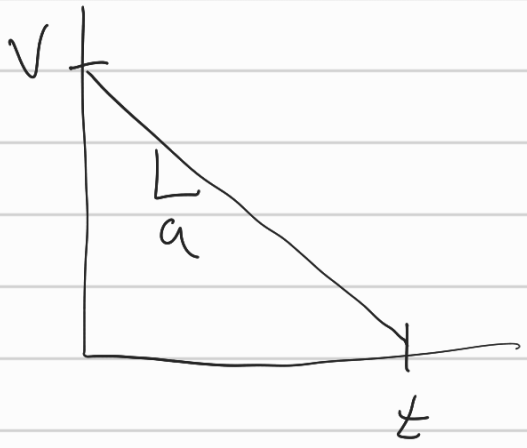
$\emptyset_c = \tan^{-1}\left(\left(\frac{1}{2}(L+b) + m\right) / X_c\right)$

$S = r(\emptyset_p - \emptyset_c)$

return S

7) $t = \frac{V}{a}$

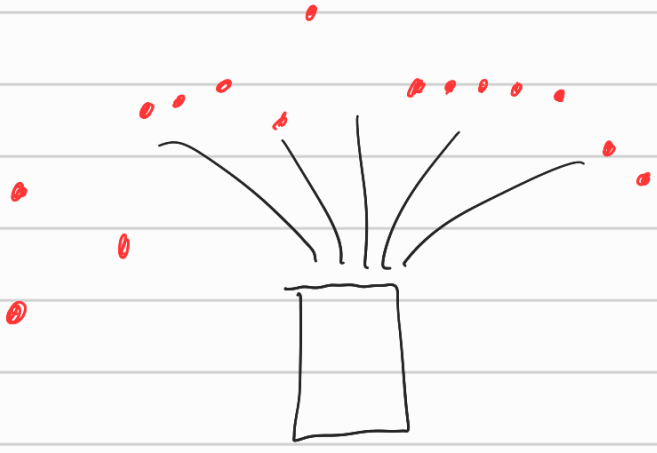
$X_{min} = \frac{tV}{2} = \boxed{\frac{V^2}{2a}}$



Extras

Point Cloud

- θ_{min}
- θ_{max}
- $\Delta\theta$
- r_{min}
- r_{max}
- $[P_n]$



For any curve, map C to PointCloud Index, move in direction until we find Cleared point