

# TM\_big\_hw1

🕒 Created	@Sep 27, 2019 1:54 PM
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🕒 Updated	@Sep 16, 2020 8:47 AM

**Task:** We have a mobile vehicle, which should survive after the track. We have some predefined trajectory, which is given in  $y(x)$  format — our goal to pass this trajectory as fast as possible. But at the end of the course, there is a drop-off. It means that we should stop our machine at the end of the trajectory. We have to establish some constraints, such as max tangent acceleration (max power on the motor) and normal (road adhesion). Despite it, the best way is to represent our robot as a particle. How should we move (speed and acceleration) for solving such a task?

**A report should contains:**

- What tools are you using (languages and so on).
- Solution description (pseudocode algorithms or whatever).
- Plots:  $Y(x)$ ,  $Y(t)$ ,  $v(t)$ ,  $a_t(t)$ ,  $a_n(t)$ .

**Parameters:**

$$a_{t_{max}} = 10 \text{ m/s}^2$$

$$a_{n_{max}} = 6 \text{ m/s}^2$$

$$v_{max} = 1.5 \text{ m/s}$$

$$y(x) = A * \sin(\omega \cdot x + \theta_0), \text{ where } A = 1, \omega = 3, \theta_0 = 0.2, x \text{ exists } [0...4]$$