AMERICAN UNIVERSITY OF ARMENIA
College of Science and Engineering
ENGS 121 Mechanics
Project 01

Deadline: Sunday, March 01, 2020, **NO LATER THAN 22:00 SHARP**
Reference: Chapter 1. Vectors and Kinematics, sections 1.7 – 1.10, pages 12-26

Description: Consider a car approaching a road intersection, the traffic light is green and it keeps up the speed planning that it will be through. Before that happens, however, the stop-light turns yellow. It needs to be decided to either stop or quickly run through before the light turns red. The list of main parameters includes:

- Car's initial speed **20** km/s $\leq v_0 \leq$ **80** km/s;
- Intial distance to the intersection **10** m $\leq x_0 \leq$ **150** m;
- Duration of the yellow light **2** s $\leq \Delta t_{yellow} \leq$ **5** s;
- Intersection's width **5** m $\leq \Delta s \leq$ **20** m;
- Magnitude of car's constant positive acceleration (at accelerated motion) **1** m/s^2 $\leq a_p \leq$ **3** m/s^2;
- Magnitude of car's constant negative acceleration (at decelerated motion) **1** m/s^2 $\leq a_n \leq$ **3** m/s^2.

Tasks:
1. Create a project repository and send its link to skhachat@aua.am and irina_tirosyan@edu.aua.am. The submission deadline of the project repository link is **Saturday, February 22 2020, no later than 22:00 SHARP**.
2. Write an OOP code that implements the concepts of car and road intersection, inputs the parameters and outputs the suggestion to accelerate or stop.
3. Run the program for different values of the input parameters and prepare a short report with the discussion how they affect the decision.
4. Draw the distance-time and speed-distance graphs and indicate the prohibited values.
5. Repeat the project assuming bounded maximal speed **50** km/s $\leq V_{max} \leq$ **100** km/s.
6. Repeat the project assuming two cars approaching the road intersection in the same direction, where x_0 is the distance from the frontal car to the intersection and the distance between the rear and the frontal cars is **10** m $\leq d \leq$ **100** m. Output suggestions for both cars.

Submission Conditions:
1. The project will be checked in online regime – no separate submissions needed.
2. Identical or similar files / results / reports / etc. will be disqualified – both the source(s) and receiver(s) will collect.
3. You are welcome to use project artifacts from external sources, including the projects of your classmates. Each such case, however, must be explicitly stated with the link to the source. Such artifacts will not be graded.
4. The projects will be graded as appearing at 22:00 on Sunday, March 01 2020.