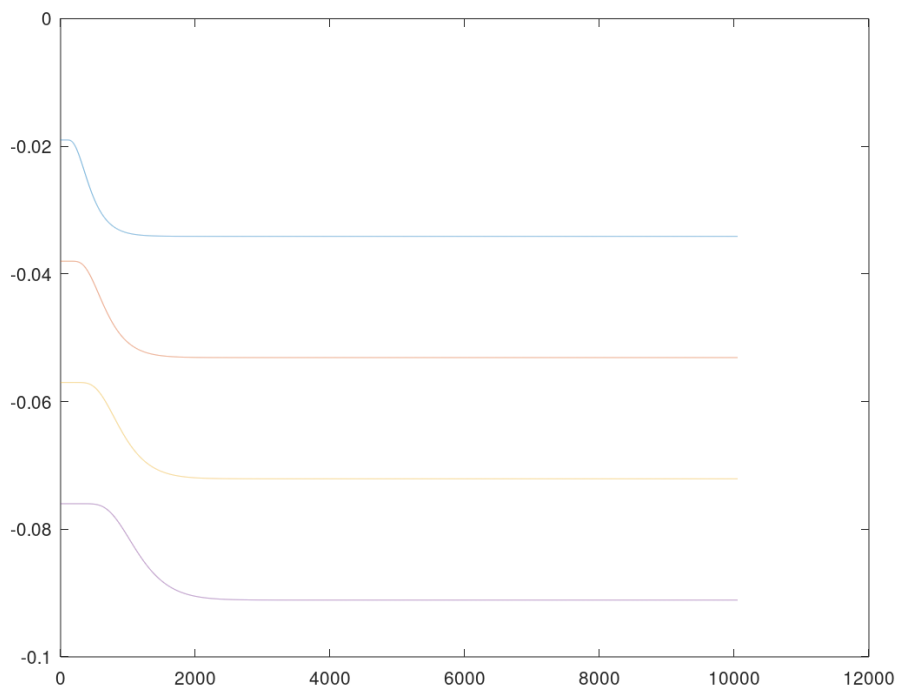


Assignment One

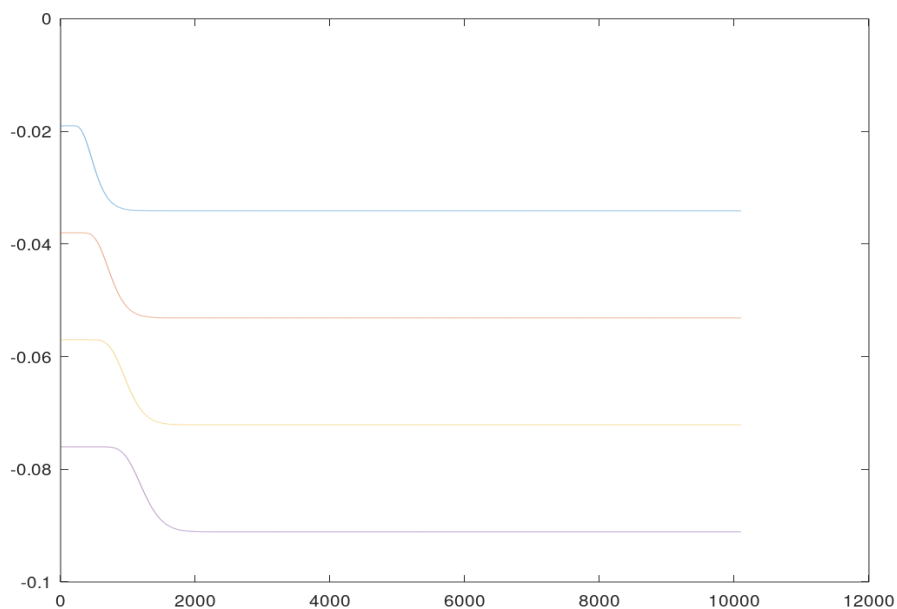
Question Two:

- Plot the results from three different reaction times: 0.5, 1 and 2 seconds. Also use two different k values 0.1, 0.2 and use the values given in the question.
 - ❖ For all the graphs below, the x axis represents the scaled up time, by a factor of 100. The y axis represents $z_i(t) - (i-1)d$.
 - ❖ The top most line curve in each of the graphs is for Car 2 and the ones below are for Car 3, Car 4, Car 5.

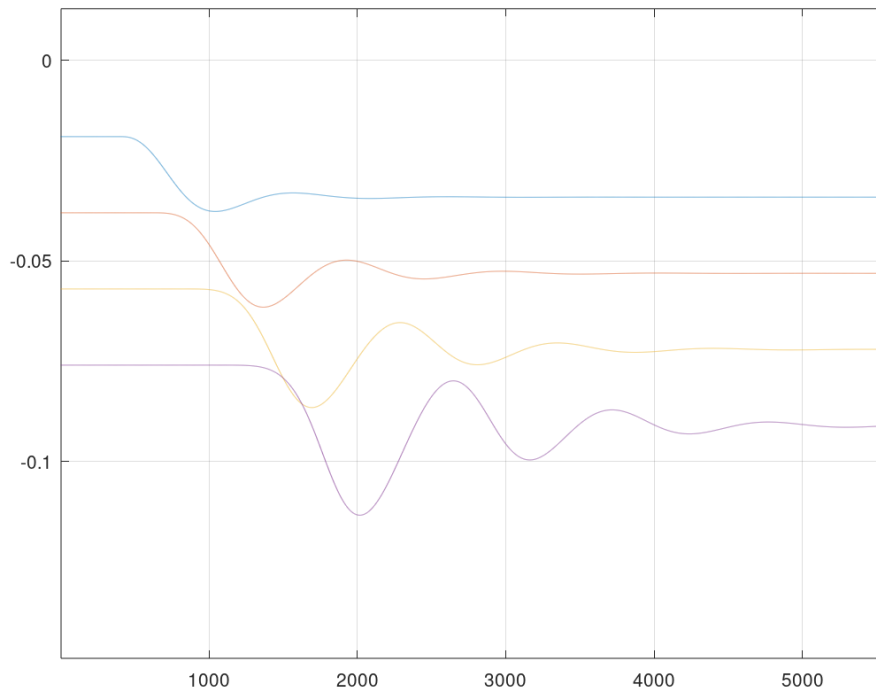
1. $K=0.2$, reaction time=0.5 seconds



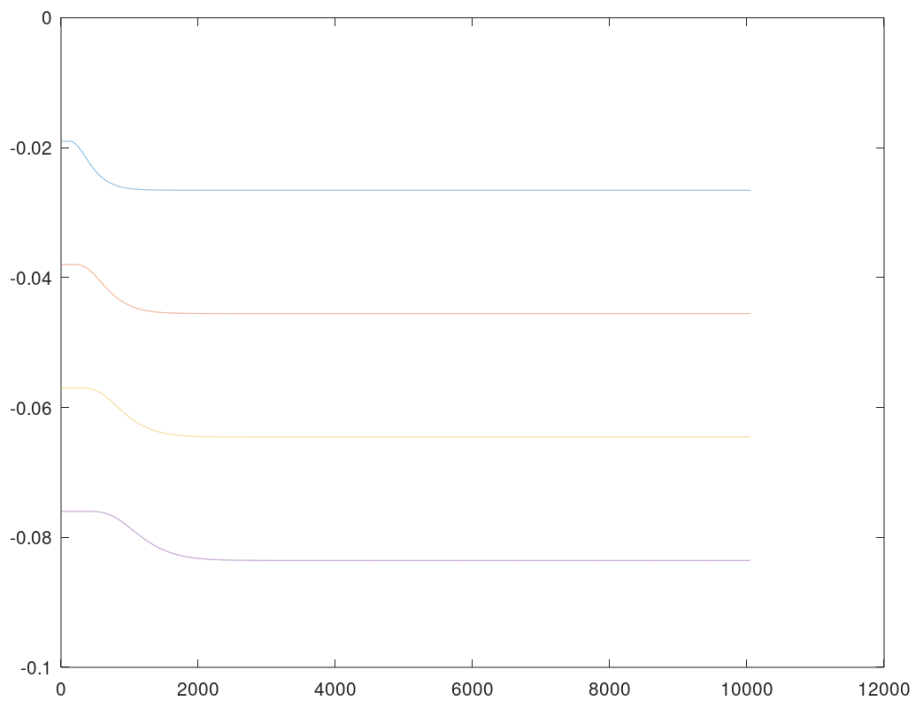
2. $K=0.2$, reaction time=1 seconds



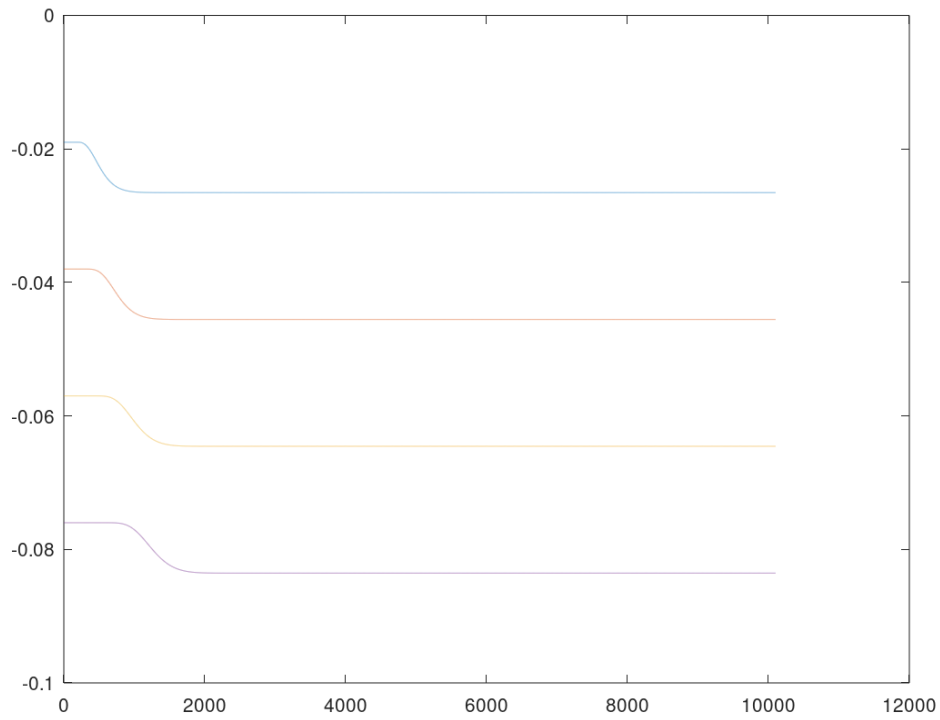
3. $K=0.2$, reaction time= 2 seconds



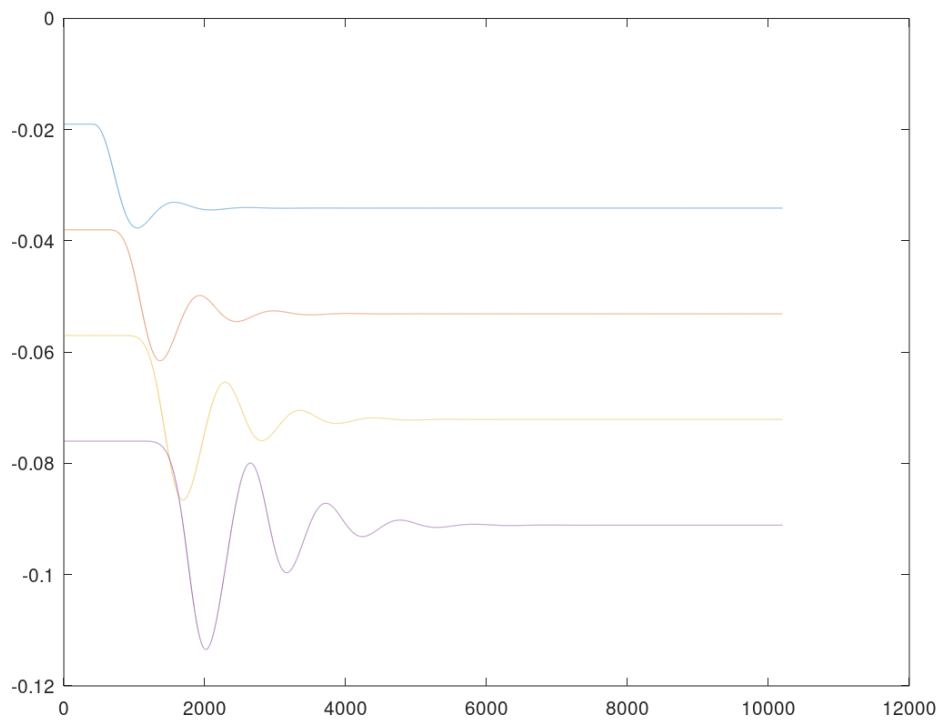
4. $K=0.1$, reaction time=0.5 seconds



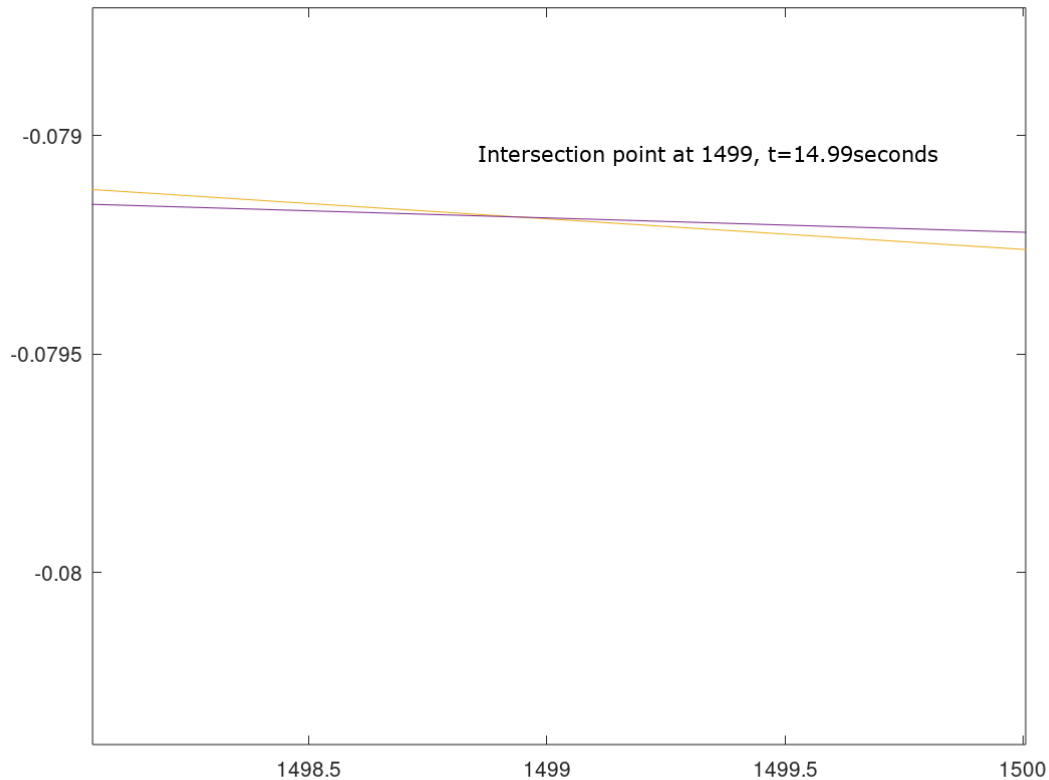
5. $K=0.1$, reaction time= 1 second



6. $K=0.1$, reaction time=2 seconds



- At what time and position and which cars collide



Using the plot when $K=0.1$ and time is 2 seconds, and by zooming in you get the plot above. You can clearly see that the cars collide at the point 1499 on the x axis. As the co-ordinates have been scaled by a factor of 100, we get the time of collision to be

$$T_{\text{collision}} = (1499/100) = 14.99 \text{ seconds}$$

The cars which collide are Car 4 and Car 5, as seen from the plots above. We do not consider the second intersection point, since the model fails when the cars collide once.

References Used:

- ❖ http://scholarpedia.org/article/Stiff_delay_equations
- ❖ Prof. Sundar's Notes