Assignment 1

Problem 1

You attempt a 105c (two-and-a-half flips forward in a tuck position) off of a 10 m diving platform. Assuming you can rotate at a maximum rate of one flip per second and you can jump a maximum of 1 m upwards off the board: a) what is the fastest initial velocity (upwards) that you can have? b) how much time passes before you hit the water? and c) can you complete the skill?

Problem 2

A car accelerates at a rate of $25\frac{\text{km}}{\text{hr}*\text{s}}$. How much time does it take to get to 125 km/hr? How much distance will the car cover in this time?

Problem 3

You decide to try and measure the speed of a car you're riding in by timing the distance between power poles. Your data is given in Table 1:

Distance (m)	Time (s)
0	0
80	2.5
168	5.1
245	7.6
315	9.1

Table 1: Measurements from the back seat

What is the overall average velocity? How about the average velocity of each measurement? Draw both the overall average and segment averages on a v-t graph.

Problem 4

A train accelerates at a constant rate a_c from rest. Draw a-t, v-t, and x-t graphs for the train. What is the overall shape of the position graph?