

## Introduction to Flight Simulation (List 7)

Due: 30 november 2010

1. Let  $\mathcal{O}$  be a loosely connected object, that is characterized by the following point masses:

mass (kg)	position (m)	speed (m/s)
1	(0, 0, 0)	(1, 2, 3)
2	(0, 2, 0)	(-1, 0, 3)
3	(1, 3, 0)	(4, -2, 6)
4	(2, 4, 7)	(-8, 2, 3)

Compute, for which you may use `vector.h`, or any program that you wrote by yourself, the center of mass of this loosely connected object, and its average speed.

2. If assume that no forces are working on  $\mathcal{O}$ , all its point masses will continue their movement without changing their speeds. Assume that  $\mathcal{O}$  describes the object at  $t = 0$ , describe its state at  $t = 5$ .
3. Compute the angular momentum of  $\mathcal{O}$  around point (1, 1, 1). Same around point (1, -1, -3).
4. Assume that force  $\vec{F} = (4, 5, 6)$  works at the first point mass of object  $\mathcal{O}$ . Compute the torque caused by this force around the center of gravity of the object.
5. Compute the inertia matrix of object  $\mathcal{O}$  around point (1, 0, 2).

For this task list, you don't need to write beautiful programs. Just a program that can solve the task is enough.