

Homework 1

Total 26 points

Due Wednesday, September 4, 12:50 pm in class.

Reading: Chapter 1 from the textbook.

Note: Make your solutions neat, concise, and intelligible. It is not sufficient just to state the answer. Points may be deducted, if it is difficult to find and/or understand the solutions.

Problem 1 [2pts]. Vector algebra. Problem 1.2★ from the textbook.

Problem 2 [2pts] . Finding the angle between two vectors. Problem 1.5★ from the textbook.

Problem 3 [3pts]. Kinematics of circular motion. Problem 1.10★ from the textbook. Illustrate this problem with a sketch. Additional question: demonstrate that vectors for particle position and velocity are orthogonal.

Problem 4 [4pts]. The volume of a parallelepiped. Problem 1.21★★ from the textbook.

Problem 5 [5pts]. Solving vector equations. Problem 1.23★★ from the textbook.

Problem 6 [4pts]. Four snails are sitting at the corners of a square with the side 1 meter. At time $t=0$ they start to crawl with the constant speed of 1 m per hour in the direction of their right neighbor. Each snail carefully watches its neighbors and adjusts the direction of its movement so it is always pointing to the neighbor on the right. Calculate time t when snails meet at the center of the square.

Problem 7 [6pts]. Projectile motion. Problem 1.40★★★ from the textbook.