Dynamics of mass point

- 1. Body with mass m = 3 kg moves on a substrate and its position at any time can be determined using the position vector $\vec{r} = 5t^3\vec{i} + (3t^2 2)\vec{j} 4t\vec{k}$. Determine the momentum and force of body in time t = 5 s. Neglect pad friction and air resistance.
- 2. Car with a weight of 1 tone is in the rest. A constant force of 1,5 kN starts to act on him (the car starts to move due to the force). Neglect resistance and friction forces. Calculate:
 - a.) acceleration of the car,
 - b.) the speed of the car in the time 5 minutes from the beginning of the action of force,
 - c.) the distance the car travels in half an hour from the start of the movement (application of force).
- 3. A projectile with a mass of 10 kg flying along the railway line at a speed of $500 m.s^{-1}$ crashed into a wagon with sand with a mass of 5t and got stuck in it. Calculate at what speed and in which direction the wagon will move after the impact, if before the collision it had a speed of $25 km.h^{-1}$ and was moving
 - a) in the direction of the projectile,
 - b) opposite the projectile.
- 4. Projectile with a mass of 20 g hits a tree at a speed of $400 m.s^{-1}$. Calculate how deep the projectile penetrates the tree if the average wood resistance is 10 kN.