Your solutions should be neat, correct and complete. Same instructions as Mission 1 apply here.

Recommended Homework from Textbook: problems:

8.3, 8.8, 8.15, 8.16, 8.25, 8.29, 8.43, 8.46, 8.59, 8.73, 8.79, 8.87, 8.100, 8.101, 8.105

I also reccommend you work on understanding whatever details of lecture seem mysterious at first.

Required Reading 5 [1pt] Your signature below indicates you have read:

(a.) I read Lectures 21 and 22 by Cook as announced in Blackboard: _____.

(b.) I read Chapter 8 and 9 of the required text: _____.

Problem 41 [3pts] Suppose $m_1 = 3.0kg$ is at $\vec{\mathbf{r}}_1 = (1.0m)\langle 1, 2, 3\rangle$ and $m_2 = 4.0kg$ is at $\vec{\mathbf{r}}_2 = (1.0m)\langle -1, 0, 6\rangle$ and $m_3 = 3.0kg$ is at $\vec{\mathbf{r}}_3 = (1.0m)\langle 4, 4, 4\rangle$. Find the center of mass for this system of three masses.

Problem 42 [3pts] Suppose the linear mass density of a cone is given by $\lambda = (3.0\,kg/m^2)x$ for $0 \leq x \leq 30\,cm$ where $x = 0$ corresponds to the tip of the cone and $x = 30\,cm$ gives the base. Find the center of mass for this distribution of mass (notice, while a cone is three-dimensional, clearly the center of mass is on the axis so we are able to treat the problem with single-variate calculus)

Problem 43 [3pts] A $2000\,kg$ car collides with a $3000\,kg$ elephant standing in the intersection. The initial speed of the car is $10\,m/s$. In the process of the collision the elephant sits on the car. What is the speed of the car-e-phant just after the collision?

Problem 44 [3pts] An exploding $0.025\,kg$ bullet is fired at 30^o above the horizontal at a speed of $500\,m/s$. At the top of its trajectory is explodes into two equal mass pieces. These pieces fly off in directions which initially form a right angle. How much energy was converted into kinetic energy by the explosion?

Problem 45 [3pts] A $3000\,kg$ truck travels past a highway overpass at $20\,m/s$. A heavy ninja of mass $150kg$ runs from a bridge which is nearly level with the top of the truck (we can ignore vertical motion). If the truck driver will notice a change of more than 1% in the speed then what is the minimum speed the ninja must run to jump on the truck without being noticed ?

Problem 46 [3pts] A bullet is shot through a clay pendulum bob. In the process of the bullets travel through the pendulum bob it loses half of its kinetic energy. The mass of the pendulum is $0.050\,kg$. How far does the pendulum swing upward?

Problem 47 [3pts] Problem 8.37 (football collision)

Problem 48 [3pts] Problem 8.44 (spring mass collision)

Problem 49 [3pts] Problem 8.70 (hockey repulsion)

Problem 50 [3pts] Problem 8.66 (force, momentum, integral calculus)