

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

Recommended Homework from Textbook: problems:

6.2, 6.5, 6.11, 6.20, 6.34, 6.47, 6.52, 6.60, 6.71, 6.79, 6.85, 6.93, 6.101

7.5, 7.7, 7.15, 7.35, 7.38, 7.39, 7.47, 7.49, 7.55, 7.64, 7.65, 7.86

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

Required Reading 4 [1pt] Your signature below indicates you have read:

(a.) I read Lectures 16, 17, 18 and 19 by Cook as announced in Blackboard: _____.

(b.) I read Chapter 7 of the required text: _____.

Problem 31 [3pts] A projectile is shot with a speed v_o at an angle of inclination θ such that it has $1/2$ as much kinetic energy is half the initial kinetic energy. Find θ .

Problem 32 [3pts] An Atwood machine consists of two masses m_1 , m_2 hung over a pulley by a string. Assume the pulley and string are massless and friction is negligible. Suppose $m_2 = 4m_1$. What is the speed of m_2 once it has fallen a distance h from its initial state of rest.

Problem 33 [3pts] Again consider an Atwood machine where the pulley and string are massless and friction is negligible. Assume $m_1 = 10.0\text{kg}$ and $m_2 = 3.0\text{kg}$. Furthermore, the m_2 is attached to a vertical spring with constant $k = 100\text{N/m}$. If the masses have an initial speed of 3.0m/s and the spring is at its equilibrium position then find how far the spring stretches. What happens after that point? Describe the motion.

Problem 34 [3pts] Suppose $U(x) = x^2 - x^4$ is the potential energy function. Plot the energy diagram and comment on the stability of any critical points. If F is the force described by this potential energy function then explain where the force is directed right/left. Please give your answer in terms of interval notation. (for example if $2 \leq x \leq 3$ was where F points right then you would say "the force is directed to the right on $[2, 3]$ ")

Problem 35 [3pts] Find the potential energy for spring with variable spring "constant". In particular, suppose $F = (k + \alpha x)x$ where k, α are constants. Find the potential energy function for this force.

Problem 36 [3pts] Problem 7.12 (Tarzan and Jane)

Problem 37 [3pts] Problem 7.32 (Sliding Toolbox)

Problem 38 [3pts] Problem 7.36 (deriving force from PE)

Problem 39 [3pts] Problem 7.45 (Roller Coaster)

Problem 40 [3pts] Problem 7.18 (Slingshot)