All Assignments

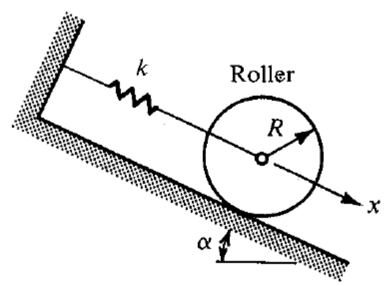
Use MATLAB wherever possible to work the problem or check your work on a problem. ***Whenever a requested problem asks you to plot or sketch the answer, you must use MATLAB to do your work***.

Treat the homework like a quiz! In other words, don't do the homework with the notes open. Instead, study and learn the material as well as you can, and then try to work the homework problems. If you get stuck, cover up the homework, re-read the notes, and try again.

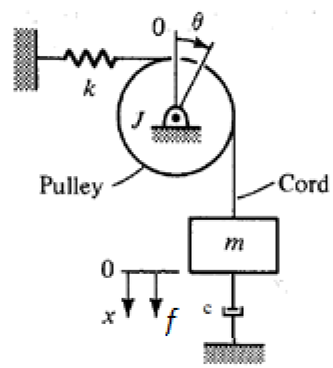
If you work homework as a group, you **must** identify the group*.

Assignment-3

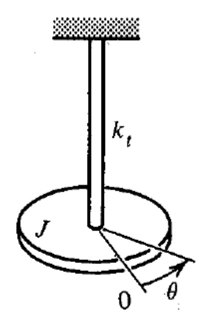
- Reading - Lecture Notes
  - Sections #2 & #3
- Reference - *Tse, Morse, & Hinkle*
  - Chapter 2 - Single Degree of Freedom Theory
- Homework
  - **3-A)** Using Newton's Method, select a set of coordinates, draw the complete two-sided free body diagram, identify any constraint equations, and determine the equations of motion for the adjacent figure. *Assume there is no slippage between the roller and the surface.*



  - **3-B)** Using Newton's Method, select a set of coordinates, draw the complete two-sided free body diagram, identify any constraint equations, and determine the equations of motion for the adjacent figure. *Assume there is no slippage between the cord and the pulley.*



  - **3-C)** Using Newton's Method, select a set of coordinates, draw the complete two-sided free body diagram, identify any constraint equations, and determine the equations of motion for the adjacent figure. *Assume the mass of the torsion bar is negligible.*



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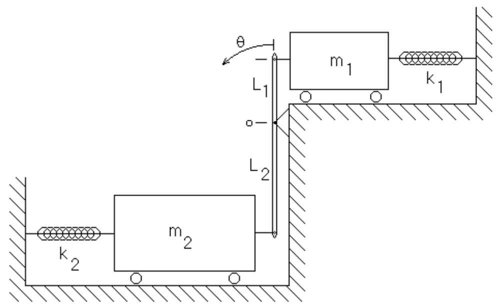
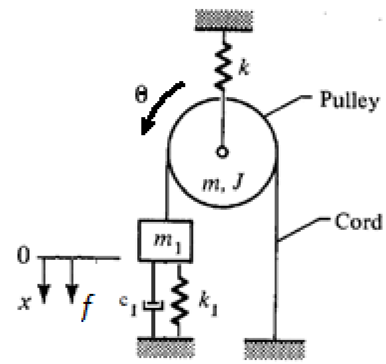
* *Remember that failure to provide proper reference/citation is called* ***plagiarism.***

- **3-D)** Using Newton's Method, select a set of coordinates, draw the complete two-sided free body diagram, identify any constraint equations, and determine the equations of motion for the adjacent figure in terms of the given coordinate θ. *Assume that the system is shown in its static equilibrium position and that the connecting link is rigid, massless, and can only rotate through a small angle (i.e. the ends of the link essentially translate).*

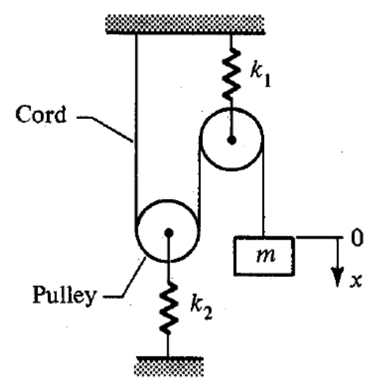


- **3-E)** Using Newton's Method, select a set of coordinates, draw the complete two-sided free body diagram, identify any constraint equations, and determine the equations of motion for the adjacent figure in terms of the given coordinate x. *Assume there is no slippage between the pulley and the cord.*



- **3-F)** Repeat problem 3-E, but solve the equations in terms of the given coordinate θ. *Assume there is no slippage between the pulley and the cord.*

- **3-G)** Using Newton's Method, select a set of coordinates, draw the complete two-sided free body diagram, identify any constraint equations, and determine the equations of motion for the adjacent figure. *Neglect the mass of the pulleys.*



For each of the following problems: solve using Newton's Method, select a set of coordinates, draw the complete two-sided free body diagram, identify any constraint equations, determine the equations of motion, then identify the requested information.

- **3-H)** A 6 lb_m mass attached to a light spring elongates it by 0.8 in. Determine the natural frequency (in Hz) of the system.

- **3-I)** An unknown mass of m kg attached to the end of an unknown spring k has a natural frequency of 110 Hz. When an additional 0.3-kg mass is added to m, the natural frequency is lowered to 83 Hz. Determine the unknown mass m and the spring constant k N/m.