

Spring 2009

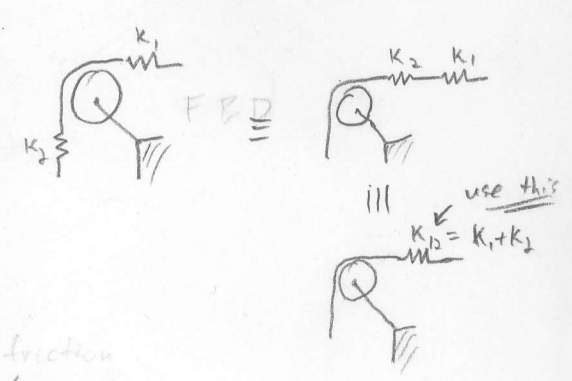
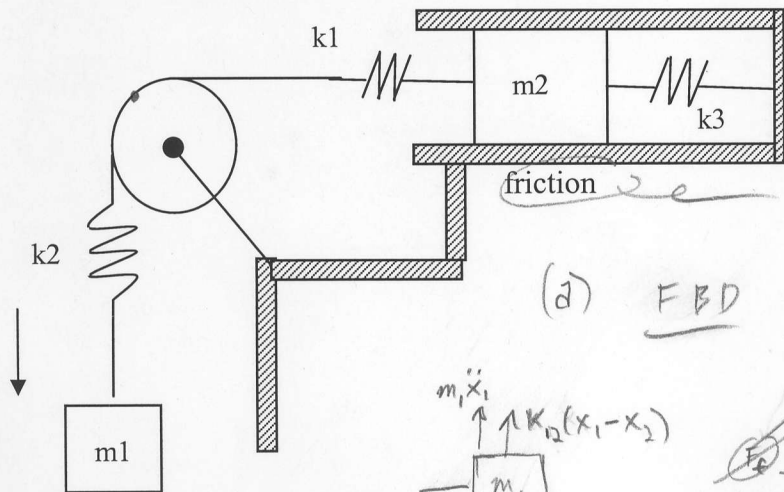
Closed book

Student's Identification Number

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For one of the systems shown below, develop a complete model and the corresponding simulation using.

- Make a free body diagram.
- Generate the differential equations in the second order form.
- Draw a block diagram and enter it in SIMULINK.
- Perform a computer simulation and display plots of:
  - Force on m2
  - Displacement of k2
  - Displacement of m1



(d) FBD

(b)  $\sum F_x: -m_2 \ddot{x}_2 - K_3 x_2 - F_f - K_{12}(x_2 - x_1) = 0,$   
 $\sum F_y: F_g - m_1 \ddot{x}_1 - K_{12}(x_1 - x_2) = 0$

$m_2 \ddot{x}_2 = -K_3 x_2 - F - K_{12}(x_2 - x_1)$

$m_1 \ddot{x}_1 = m_1 g + K_{12}(x_2 - x_1)$

$g$  is  $z$  (+) quantity.

(c)

