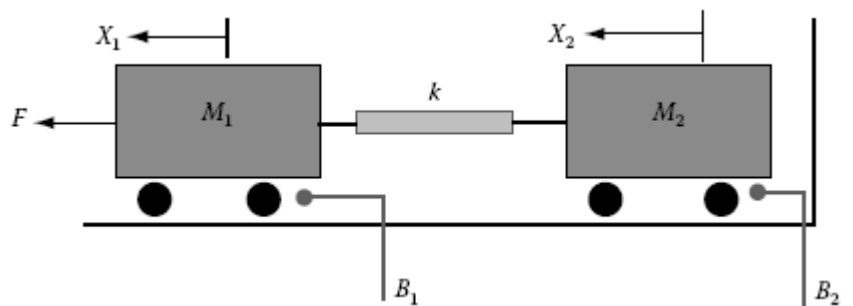
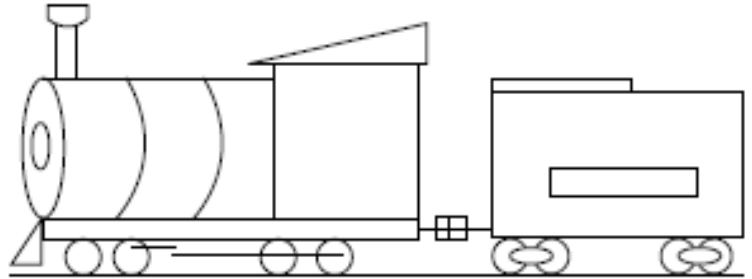


Mansoura University		Computer Engineering and Control Syst. Dept. Total Marks: 40 Marks	Faculty of Engineering
Course Title: Control Engineering 1		Course Code: CSE 3116	
Date: 25 Nov. 2014		Allowed time: 2 hr.	No. of Pages: (02)
Remarks: (Answer the following questions... assume any missing data)			

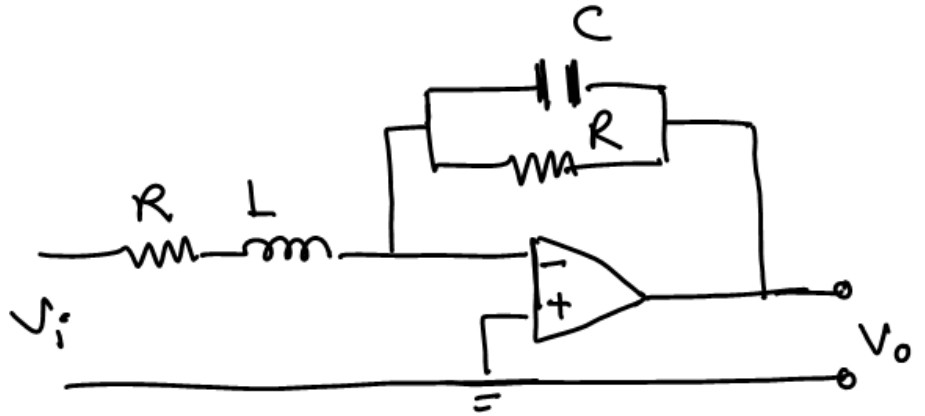
Question No. (1) (10 Marks)

Consider a toy train consisting of an engine and a car as shown. Assuming that the train travels only in one direction, we want to apply control to the train so that it has a smooth start-up and stop and a constant-speed ride. The mass of the engine and the car will be represented by M_1 and M_2 , respectively. The two are held together by a spring, which has the stiffness coefficient of k . F represents the force applied by the engine, and μ represents the coefficient of rolling friction where $B_1 = \mu M_1 g$ and $B_2 = \mu M_2 g$. Sketch the **Block Diagram**



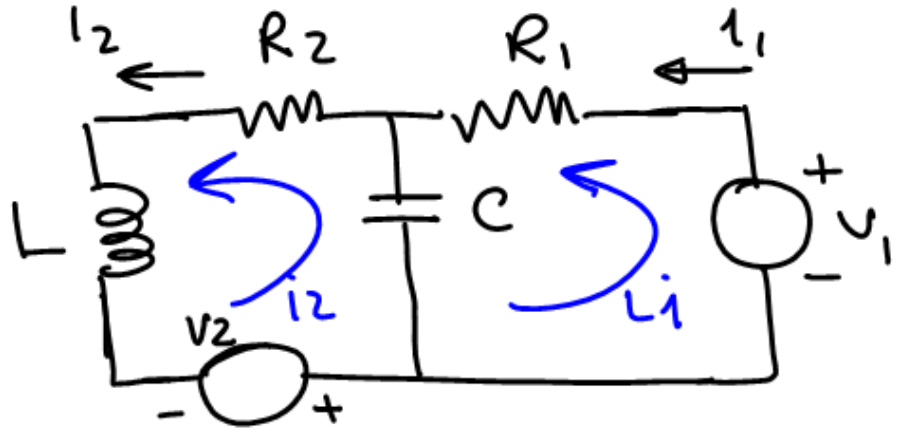
Question No. (2) (10 Marks)

Find the transfer function of the operational amplifier circuit of fig. shown next, and use it to find $V_o(\infty)$



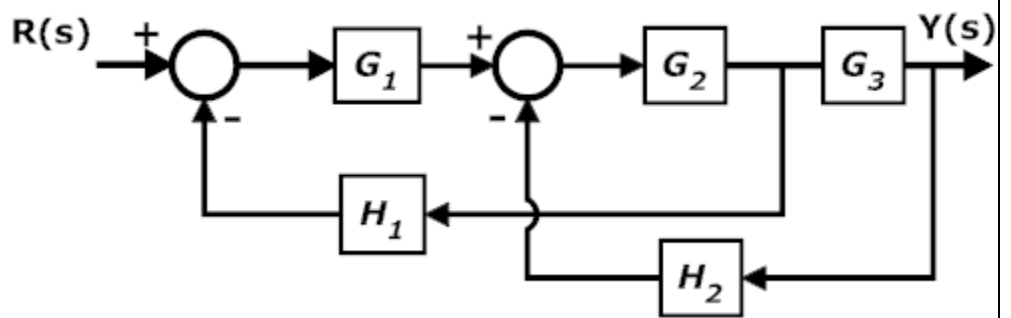
Question No. (3) (10 Marks)

Sketch the block diagram for the electrical circuit show next, and then determine $\frac{I_2}{V_1} \Big|_{V_2=0}$



Question No. (4) (10 Marks)

Use Block diagram reduction to find transfer function $\frac{Y(s)}{R(s)}$



Best wishes
Dr. Mostafa A. El-hosseini