**Mechanical Engineering
345 – Mechatronics**
Final Exam
Cameron Devine
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Directions: In class exam, 2 hours, open notes, open book. Calculators allowed. Use your own paper, work neatly and clearly mark your answers. Partial credit may be given.
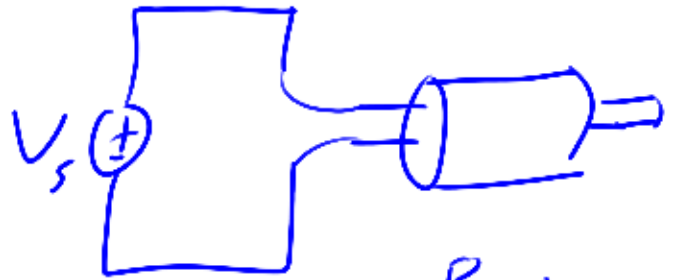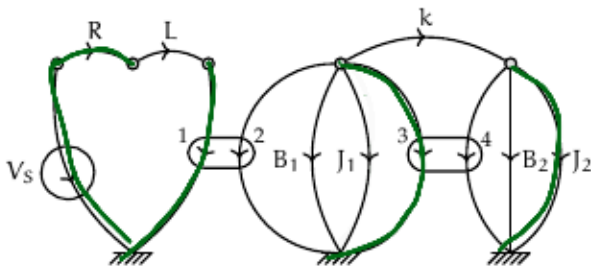
Problem deglazification

Explain in your own words what lumped parameter elements should be used when modeling an electric motor and why.
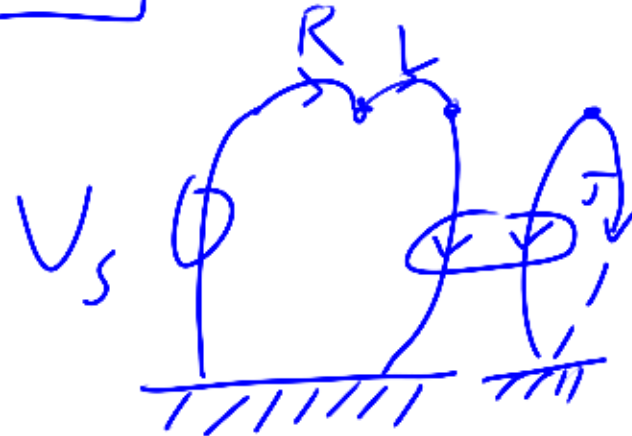
_____/10 p.

Problem confuzzled

In the linear graph below a system is depicted consisting of a motor with its related damping and inertia driven by a voltage source and connected to a set of gears driving a second inertia. A rotary spring is attached between the two inertias.
Given this linear graph:

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a draw a normal tree,
b determine the state variables and system order, and
c list any dependent energy storage elements and explain what this implies.

State variables: Ω_{J_2} i_L τ_k $n = 3$