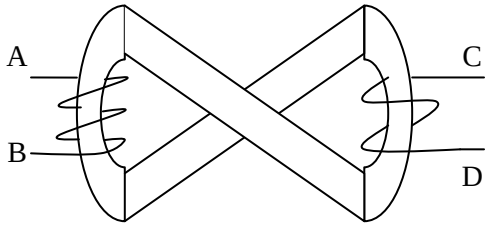
Name: _____

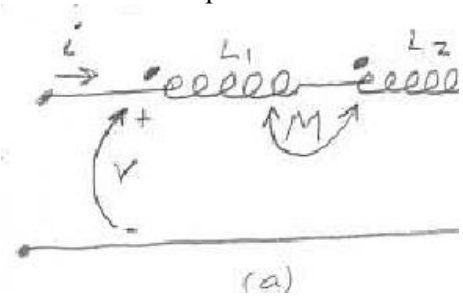
EE 303, Quiz 3, Spring 2019, Dr. McCalley. Time: 20 minutes, closed book, closed notes, no communication devices

1. (30 pts) Determine the placement of the dots for the coupled coils shown in figure below.



Solution: (A and D) or (B and C)

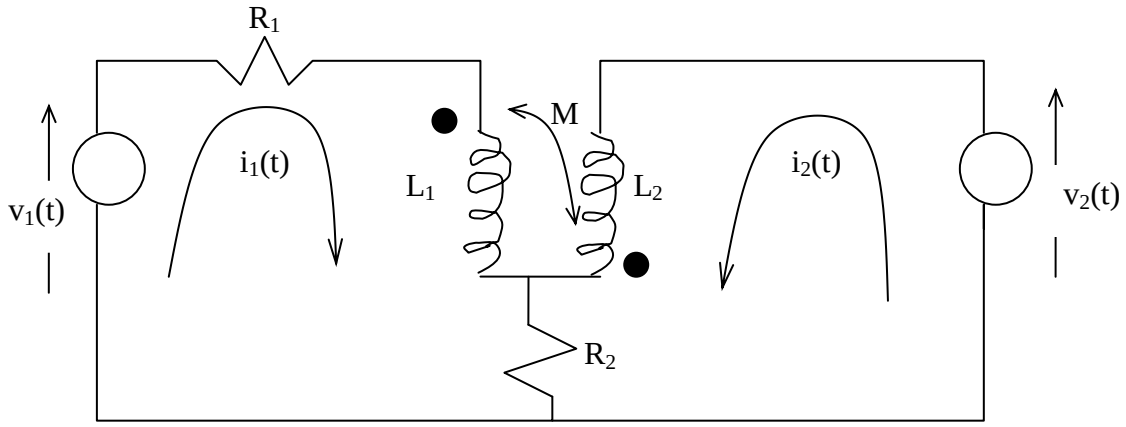
2. (40 pts) A pair of coupled inductors is connected as shown below. Find the differential equation relating v(t) and i(t), and then find the equivalent inductance "seen" at the terminals looking into the circuit.



$$v(t) = L_1 \frac{di(t)}{dt} + M \frac{di(t)}{dt} + L_2 \frac{di(t)}{dt} + M \frac{di(t)}{dt} = \left[L_1 + 2M + L_2\right] \frac{di(t)}{dt}$$

$$\Rightarrow L_{eq} = L_1 + 2M + L_2$$

3. (30 pts) For the circuit below, express (a) $v_1(t)$ and (b) $v_2(t)$ as a function of: mesh currents $i_1(t)$ and $i_2(t)$, associated current derivatives, and other parameters indicated on the diagram.



a. Left loop: $v_1(t)=[i_1(t)+ i_2(t)]R_2+L_1 di_1(t)/dt-M di_2(t)/dt+R_1 i_1(t)$

b. Right loop : $v_2(t)=[i_1(t)+ i_2(t)]R_2+L_2 di_2(t)/dt-M di_1(t)/dt$