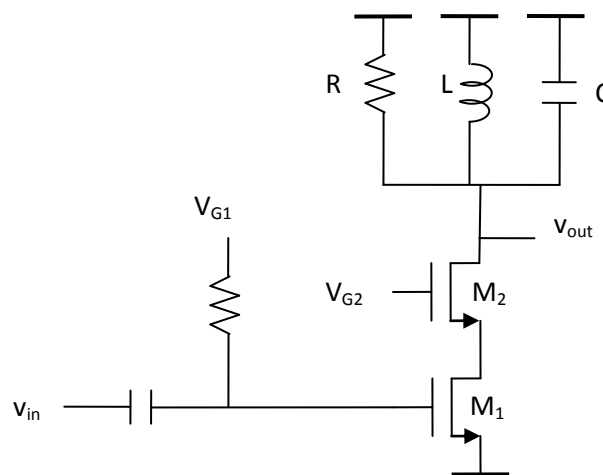


## Problems for exercise 3 (RLC-circuits & amplifiers)

1. Problem 3.1 (solved by teacher)
2. Problem 3.2 with extension: Calculate also the peak currents in the inductors  
(Hint: start by calculating to which impedance we want to transform the load)
3. Problem 3.5
4. Problem 3.6
5. Problem 9.5 (solved by the teacher)
6. Problem 9.7 (solved by the teacher)
7. A tuned amplifier is to be designed. Given:
  - process parameters according to the data sheet (0.13 $\mu\text{m}$ ), supply voltage = 1.2V
  - on-chip inductors have a Q of 10 for values below 10nH, otherwise  $Q \cdot L = 100\text{nH}$
  - long channel operation (quadratic characteristic) can be assumed
  - desired voltage gain = 5
  - frequency of operation = 1GHz
  - bandwidth = 200MHz
  - largest input signal before clipping = 0.2Vpp
  - load capacitance = 100fF
  - transistor length = 0.3 $\mu\text{m}$
  - use a cascode topology according to the figure:



Determine the dimensions of M1 and M2 (M2 is assumed equal to M1), the bias voltages, R, L and C. How large is the current drain?