Problem 3 – 15 points

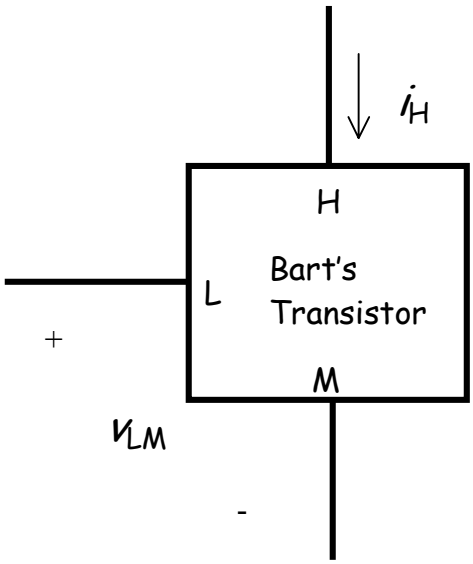
Bart has created a **new kind** of transistor for Springfield Elementary's science fair.

This transistor has **three terminals**, named Homer (**H**), Lisa (**L**), and Marge (**M**).

Bart has discovered in the lab that i_H (in mA) is related to v_{LM} (in volts) as:

$$i_H = 3\,(v_{LM})^2 - 2\,v_{LM} \quad (\text{mA})$$

Note that Bart's transistor is **completley unrelated** to either a BJT or a MOSFET.



Determine the **DC current (I_H)** and **small signal current ($i_h(t)$)** flowing into terminal **H** if the total voltage between terminals **L** and **M** is:

$$v_{LM} = 1 + 0.01\cos\omega t$$