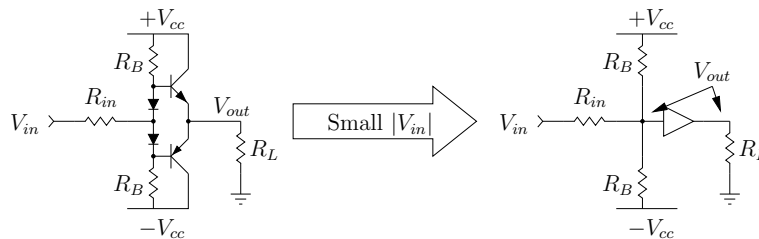


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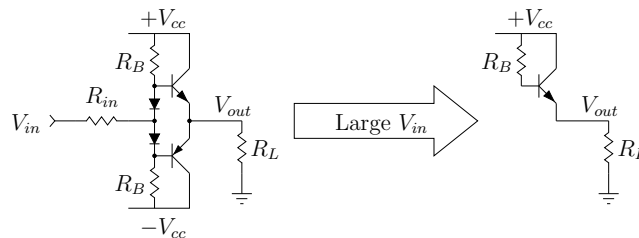
Homework #10

Show your work.

In class, we saw that diode bias (left side of each figure, below) can eliminate crossover distortion in a push-pull amplifier. Unfortunately, this circuit loads the input, so the gain depends on the impedance, R_{in} , of the signal, V_{in} . For small $|V_{in}|$, the current into the transistor bases is small. The push-pull is nearly an ideal buffer, but the input is loaded by the base resistors:



The diode biased push-pull also cannot go from rail to rail. We will consider only positive inputs, but the the negative case works out the same. If $V_{in} > 0$, the lower transistor is off. If V_{in} is high enough, then the upper diode will turn off because it is reverse biased. When this happens, the transistor sees only the part of the circuit illustrated below at right. V_{out} hits a fixed maximum.



1. What is the gain for small $|V_{in}|$?
2. Find the maximum value of V_{out} . Assume the junction voltage of the transistor is 0.7 V.
3. Calculate numeric values of gain and maximum V_{out} for the two diode biased push-pull examples from the lecture.