bjt_inverter.sqproj

Description

The BJT circuit shown in Fig. 1 acts as an inverter: When the input voltage is low, the transistor does not conduct, there is no current through RC, and the collector voltage (output) is pulled up to VCC. When the input voltage is increased, the transistor beings to conduct, the voltage drop across RC starts increasing, and the output voltage falls. Finally, when the input voltage is high enough to drive the transitor into saturation, there is a fixed small drop (V_{CE}=0.1 to 0.2 V) across the transitor, and the output voltage saturates to this low value. The transfer characteristic is shown in Fig. 2.

Assignments

1. Write V_C as a function of V_{BB} for the transition region in Fig. 2. Assume that V_{BE} is approximately 0.7 V in this region.

2. If RB is doubled, how will the plot change?

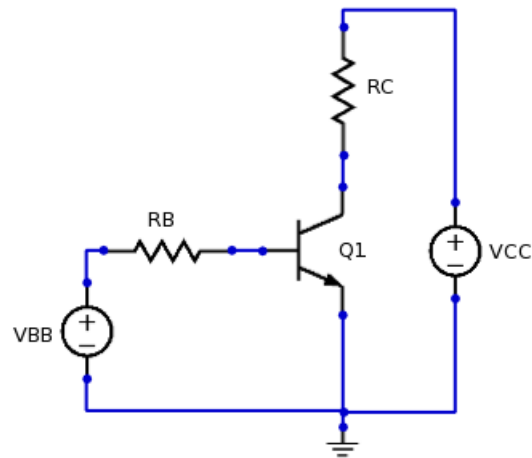3. If RC is doubled, how will the plot change?
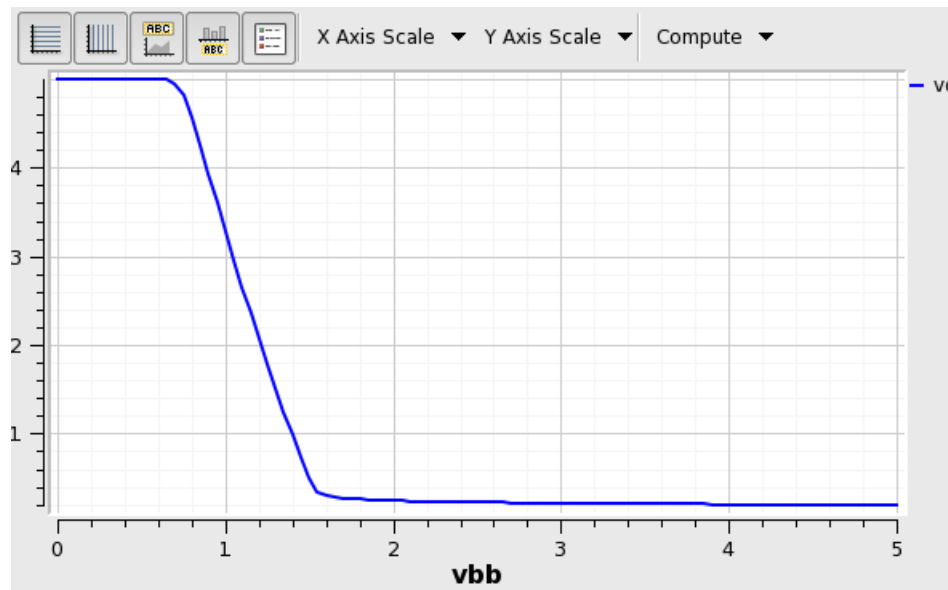
Figure 1: Circuit schematic for BJT inverter.

Figure 2: Output voltage versus input voltage for the BJT inverter in Fig. 1.