1. For the amplifier circuit answer the following questions. Assume $\beta = 100$, $V_{th} = 25\text{mV}$, and $V_{BB} = 0.7\text{V}$ for an ON transistor.

a) Calculate the DC collector, base, and emitter voltages.

\[
V_C = 7\text{V} \quad V_B = 6\text{V} \quad V_E = 5.3\text{V}
\]

\[
I_{CA} = 1\text{mA} \quad \Rightarrow \quad I_B = \frac{1}{100} \text{mA}
\]

\[
V_C = 10 - 3 \times 1 = 7\text{V}
\]

\[
V_B = 7\text{V} - \frac{100 \times 1}{100} = 6\text{V}
\]

\[
V_E = 6\text{V} - 0.7 = 5.3\text{V}
\]

b) Calculate the transistor small-signal quantities shown below.

\[
g_m = \frac{40\text{mA}}{V_{rn}} = 2.5\text{K}\text{ }\text{ohms}
\]

c) Draw the small-signal equivalent circuit for the amplifier.