Special Problem 4.6-2

For the circuit below, $V_G$ is the DC bias at the gate, $v_i$ is the small-signal input and $v_o$ the small-signal output. The transistor is known to be in the saturation region.

The capacitor in the circuit is extremely large.

1) Draw the resulting small-signal circuit.

2) In terms of transconductance $g_m$, find the small-signal gain $A_{vo} = \frac{v_o}{v_i}$.

**NOTE:** Do not attempt any DC analysis; provide your solutions directly in terms of $g_m$. Ignore the output resistance (i.e., $r_o = \infty$).