Given the Boolean expression below ($Y$ is the output), realize a single stage CMOS combinatorial logic circuit by creating complementary pull-down (PDN) and pull-up (PUP) networks.

$$Y = A \cdot \overline{B} \cdot (\overline{C} + D \cdot E)$$
Find the input to output transfer function $H(s)$. Ignore all intrinsic capacitances.
For the linear oscillator circuit shown below, find the oscillation frequency and $g_m$ value required to ensure oscillation.
Given the Boolean expression below (Y is the output), realize a single stage CMOS combinatorial logic circuit by creating complementary pull-down (PDN) and pull-up (PUP) networks.

\[ Y = (A + B) \cdot (C + D) \]
Find the small-signal Norton-equivalent input-to-output transconductance $G_m$ and output resistance $R_{out}$. Taking into account only the capacitor $C_1$ (i.e. ignore intrinsic capacitances), find the small-signal input-to-output transfer function $H(s)$. 

![Circuit Diagram]
Find the small-signal gain and the “upper 3dB frequency” \( \omega_H \).
For the linear oscillator circuit shown below, find the oscillation frequency and resistor value $R_2$ required to ensure oscillation.