Another Example:

Some \( v_{in} \), some \( g_m \)'s, \( L_0 \)'s,
\( v_D \), \( v_{BI} \), \( v_{BI2} \) biased so all transistors in saturation.

**VOTE ON GAIN:**

\[
\begin{align*}
&\text{a.} \quad -\frac{g_m v_{in}^2}{2} \\
&\text{b.} \quad \frac{g_m^2 v_{in}^2}{4} \\
&\text{c.} \quad \frac{g_m^3 v_{in}^3}{6} \\
&\text{d.} \quad \frac{g_m^4 v_{in}^4}{8}
\end{align*}
\]

**CORRECT**

\[ A_v = \frac{1}{g_m r_o}, \quad \frac{-g_m r_o^2}{2} = \frac{g_m^3 r_o^3}{4} \]

\[ \frac{\text{Source}}{\text{follower}} \]
\[ \frac{\text{common source}}{\text{cascaded source}} \]

\[ \text{Cascaded: Same } g_m \text{, but } R \text{ out much higher } \]
\[ v(\times g_m r_o) \]

**Grab poles (approx.)**

Source Follower: \[ \text{Miller Cap: } C_{gs}(\times A) \times 0 \]
\[ + C_{gd} + C_{gb} \]

Stage 2: 
\[ \frac{1}{(\frac{1}{g_m})\left[ C_{gs} + C_{gd} + (1-A)C_{gb} \right]} \]

Stage 3: No little Miller effect
\[ \frac{1}{\frac{1}{2} \left[ C_{gs} + C_{gd} + C_{gb} + C_{gd}(2) \right]} \]

Output: \[ \frac{1}{\frac{g_m r_o^2}{2} C_L} \]

\[ * \text{ For those not in my section, this is a quick way to grab pole frequencies. It's a better approximation when the poles are farther apart. For close together poles, open-circuit time constant analysis is more accurate.} \]