1. [25 points] In the circuit below, find the transfer function \( H(s) = \frac{v_{out}}{v_{in}} \), and plot \(|H(s)|\) vs. \( \omega \). In the plot, mark the value of \(|H(s)|\) when \( \omega = 1/(RC) \).
   Assume:
   - The op-amp is ideal.
   - \( R1 = R2 = R \)
   - \( C1 = C2 = C \)

2. [25 points] In the circuit below, find the small signal output voltage \( v_{out} \).
   Assume:
   - The op-amp is ideal.
   - The DC current source \( I_{Blas} \) is ideal.
   - The DC voltage sources \( V_{Blas1} \) and \( V_{Blas2} \) are ideal.
   - \( M1 \) is biased in saturation region.
   - The output resistance of \( M1 \), \( r_o = 100 k\Omega \)
   - The transconductance of \( M1 \), \( g_m = 20 mA/V \).
   - \( M1 \) has no parasitic capacitance \( (Cgs = Cgd = Csb = Cdb = 0) \).

3. [25 points] In the circuit below, find the input impedance \( Z_{in} \) seen by the voltage signal source \( v_{in} \).
   Assume:
   - The current source \( I_{Blas} \) is ideal.
   - \( M1 \) is biased in saturation region.
   - \( M1 \) has no parasitic capacitance \( (Cgs = Cgd = Csb = Cdb = 0) \).
   - The output resistance of \( M1 \), \( r_o = \infty \).

4. [25 points] In the circuit below, find the small signal output voltage \( v_{out+} \).
   Assume:
   - The circuit is fully symmetric
   - \( M1 \) and \( M2 \) are biased in saturation region.
   - The current source is ideal.
   - \( M1 \) and \( M2 \) have no parasitic capacitance \( (Cgs = Cgd = Csb = Cdb = 0) \).
   - For both \( M1 \) and \( M2 \), \( r_o = \infty \).
   - For both \( M1 \) and \( M2 \), the transconductance \( g_m = 30 mA/V \).
   - \( R1 = 1 k\Omega \)
   - \( R2 = 2 k\Omega \)
   - \( C1 = 10 \) pF