Problem #1: For each of the op-amp circuit below, identify the feedback topology. Assuming an ideal op amp, find an expression for $A_f$. 

(a) 

(b) 

(c) 

(d)
Problem #2: Find $A$, $\beta$, $A_f$, the input resistance ($R_{if}$), and the output resistance ($R_{of}$) for the single-transistor shunt-shunt feedback amplifier below assuming $\beta_{\text{transistor}}=150$ and $V_A=50V$. 

\[ V_{CC} = 3.3 \, V \]

\[ R_C = 100 \, k\Omega \]

\[ R_f = 1 \, \mu F \]

\[ R_L = 5 \, k\Omega \]

\[ V_{\text{in}} \]

\[ i_f \]
Problem #3: Analyze the shunt-series feedback amplifier below. Find the gain \( A_f \), input resistance \( R_{if} \), and output resistance \( R_{of} \). Use \( \beta_{\text{transistor}} = 100 \) and \( V_A = 100V \) with Q1 biased at 0.66mA and Q2 biased at 1.6mA.