1. (40 points) For the DC circuit given above:

   (a) Write down expressions for Kirchoff’s Current Law at the two nodes $X$ and $Y$.
   
   (b) Solve for $V_X$ and $V_Y$.
   
   (c) Show Thevenin equivalents for the components in each of the dashed boxes.
2. (30 points) The op-amp circuit shown is to be analyzed using the ideal op-amp approximations.

\[ \text{VRMS} = 4.0 \text{VRMS} \]

\[ 4.0 \text{VRMS} \]

\[ 1.0k\Omega \]

\[ 750\Omega \]

\[ 250\Omega \]

\[ V_{\text{out}} \]

(a) Give the gain of the amplifier stage in dB. Is the amplifier inverting or non-inverting?
(b) Find the power dissipated in the 250Ω resistor.

3. (30 points) The circuit shown contains a component which is chosen to minimize the current drawn from the voltage source.

(a) What is the complex impedance of this component?
(b) What component or components (resistor, capacitor, inductor) would be required to make this impedance?
(c) How much current \( I \) is drawn from the voltage source under these conditions?