PROBLEM I (final values):
  a) \( E_{\text{Pb}^{2+}, \text{Pb}} = -0.121 \text{ v} \)

\[ E_{\text{UO}_2^{2+}, \text{U}^{4+}} = +0.098 \text{ v} \]

To be a galvanic cell, \( E_{\text{cell}} = E_{\text{Uranium}} - E_{\text{Lead}} = +0.219 \text{ v} \)

b) Cathode in uranium half-cell, polarity \( \oplus \)
   Anode in lead half cell, polarity \( \ominus \)

c) overall rxn: \( \text{UO}_2^{2+} + \text{Pb}(s) + 4 \text{H}^+ \rightarrow \text{U}^{4+} + 2 \text{H}_2\text{O} + \text{Pb}^{2+} \)

PROBLEM II (final values):
  a) overall rxn: \( 16 \text{H}^+ + 5 \text{Sn}^{2+} + 2 \text{MnO}_4^- \rightarrow 5 \text{Sn}^{4+} + 2 \text{Mn}^{2+} + 8 \text{H}_2\text{O} \)

\[ \frac{4 \text{ g Sn}}{g \text{ total}} \times 100 \% = 5.380 \% \text{Sn} \]

PROBLEM III (final values):
  a) \( \text{O}_2 \text{O}^- + e^- + 2 \text{H}^+ \rightarrow \text{H}_2\text{O} + \text{O}_2 \text{O}^- \)

  b) \( (\text{H}_2\text{O}_2\text{Cl}_2)^0 \)

  c) 4

  d) 2

PROBLEM IV (final values):
  a) "Generic": \( \frac{d[\text{BrO}_3^-]}{dt} = k [\text{BrO}_3^-]^x [\text{H}^+]^y \)

  Note: \([\text{Br}^-]\) is not included separately because no data are provided; its effect would be included within the \( k \) here.

  Rate law: \( \frac{d[\text{BrO}_3^-]}{dt} = (5.00 \text{ M}^{-2} \text{s}^{-1}) [\text{BrO}_3^-] [\text{H}^+]^2 \)

  b) \( 4.00 \times 10^{-2} \text{ M/s} \)

  c) \( 3.00 \times 10^{-2} \text{ M/s} \)