1. \( \delta(8_0, a, 2) = \{(8_0, a, 2)\} \)
   \( \delta(8_0, b, 2) = \{(8_0, b, 2)\} \)
   \( \delta(8_0, a, a) = \{(8_0, a, a)\} \)
   \( \delta(8_0, b, a) = \{(8_0, b, a)\} \)
   \( \delta(8_0, a, b) = \{(8_0, a, b)\} \)
   \( \delta(8_0, b, b) = \{(8_0, b, b)\} \)
   \( \epsilon(8_0, c, a) = \{(8_0, a)\} \)
   \( \delta(8_0, c, b) = \{(8_0, b)\} \)
   \( \delta(8_0, c, z) = \{(8_0, z)\} \)
   \( \delta(8_0, a, a) = \{(8_0, a, a)\} \)
   \( \delta(8_0, b, b) = \{(8_0, b, b)\} \)
   \( \delta(8_0, z, 2) = \{(8_0, z, 2)\} \)

2. PG 212, 4.3: Given \( m \), choose \( \omega = a^{3m}b^{4m}c^{2m} \).
   Application of the Pumping Lemma gives the result.

3. PG 220, 17.2: \( L_1 = \{a^n b^n : n \geq 0, n \text{ is a multiple of 5}\} \) is regular.
   Data for \( L_1 \):
   \( L_1 \) is also regular.
   \( L_2 = \{a^n b^n : n > 0\} \) is a CFL (\cite{pg 211} on page 21).
   \( L_3 = L_1 \cup L_2 \) is a CFL.

4. PG 237, 5.0: \( L = L(a^* b^* + b^* a^*) \)