1. A lot of 200 widgets contains 10 that are defective. Two chips are selected at random, without replacement, from the lot.
   a) (2 pts) What is the probability that the first one selected is defective?
   \[ A = \text{event that first one selected is defective} \]
   \[ P(A) = \frac{10}{200} = \frac{1}{20} \]

   b) (2 pts) What is the probability that the second one selected is defective given that the first one was defective
   \[ B = \text{event that second one selected is defective} \]
   \[ P(B|A) = \frac{9}{199} \approx 0.0452 \]

   c) (2 pts) What is the probability that both are defective?
   \[ P(A \cap B) = P(B|A)P(A) = \left( \frac{1}{20} \right) \left( \frac{9}{199} \right) = \frac{9}{3980} \approx 0.00226 \]

2. (4 pts) Let A, B, and C be three events in \( \Omega \). If \( P(A) = \frac{1}{4}, P(B) = \frac{1}{6}, P(C) = \frac{1}{3}, P(A \cap B) = \frac{1}{8}, P(A \cap C) = \frac{1}{6}, \) and \( P(B \cap C) = 0, \) find \( P(A \cup B \cup C) \).

   \[ P(A \cup B \cup C) = \frac{1}{24} + \frac{1}{6} + \frac{1}{8} + \frac{1}{8} + \frac{1}{3} \]
   \[ = \frac{1}{24} \left( 1 + 4 + 3 + 3 + 8 \right) \]
   \[ = \frac{19}{24} \]