1. \( P(\text{at least one component will need replacement within a year}) = 1 - 0.9 \times 0.85 \times 0.8 = 0.388 \)

2. (a) The probability of failing part II = \( 1 - p \)

(b) \( P(\text{obtaining the certificate}) = 1 - \frac{1}{3} (1 - p) = \frac{2 + p}{3} \)

(c) If \( \frac{2 + p}{3} = \frac{4}{5} \), then \( p = \frac{2}{5} \)

3. (a) \( P(\text{the man still in Room A}) = \frac{6}{7} \)

(b) \( P(\text{the man is in Room B}) = \frac{1}{7} \times \frac{5}{6} = \frac{5}{42} \)

(c) \( P(\text{the man is in the Manager Room}) = \frac{1}{7} \times \frac{1}{6} = \frac{1}{42} \)

4. (a) \( P(50 \text{g} < E \leq 100 \text{g}) = \frac{30}{40} \times \frac{29}{39} = \frac{29}{52} \)

(b) \( P(175 \text{g} < E \leq 250 \text{g}) = \frac{2}{40} \times \frac{30}{39} = \frac{5}{13} \)

(c) \( P(300 \text{g} < E \leq 400 \text{g}) = \frac{10}{40} \times \frac{9}{39} = \frac{3}{52} \)

(d) \( P(E \leq 50 \text{g}) = 0 \)