1. One-sector technology:
   (1). Precisely define “efficiency”.
   (2). Precisely define “short-run efficiency”.
   (3). Precisely state the Phelps-Koopmans theorem on economic efficiency.
   (4). Carefully prove the theorem. What cases of long-run inefficiency might not be covered by this theorem.

2. Overlapping Generations
   2-period lives.
   \( \ell \) commodities
   1 person per generation
   \( u_0(x_0), x_0 = x_0^1, \omega_0 = \omega_0^1, m_0 = m_0^1 \) for \( t = 0 \)
   \( u_t(x_t), x_t = (x_t^t, x_t^{t+1}), \omega_t = (\omega_t^t, \omega_t^{t+1}), m_t = (m_t^t, m_t^{t+1}) \)

   (1). Define Pareto Optimality (PO).
   (2). Define Weak Pareto Optimality (WPO).
   (3). Define Short Run Pareto Optimality (SRPO).
   (4). Give the precise relationships among PO, WPO and SRPO.
   (5). State the First Welfare Theorem for OG.
   (6). State the Second Welfare Theorem for OG in two ways:
       (a) allowing only for reassigning the \( \omega' \)s
       (b) allowing only for money taxes, \( m_0, m_1, ..., m_t, ... \)