

**Econ 8108, Macroeconomic Theory**  
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**Problem Set 1**

**Problem 1**

Consider the following problem:

$$\begin{aligned} \max_{\{c_t, k_{t+1}\}_{t=0}^{\infty}} \quad & \sum_{t=0}^{\infty} \beta^t u(c_t) && (SPP) \\ \text{s.t.} \quad & c_t + k_{t+1} = f(k_t) \\ & k_0 : \text{ given.} \end{aligned}$$

Show that, under sufficient conditions, a solution to this problem exists and is unique.

**Problem 2**

Show that when we have a concave and CRS production function and aggregate labor supply in the economy is one, real wage and interest rate in equilibrium is given by

$$\begin{aligned} w &= f(K) - f'(K)K \\ r &= f'(K) \end{aligned}$$

**Problem 3**

Consider the RHS of equation (RCE) in the notes. Show that under appropriate conditions on  $G$ , this is contraction.

**Problem 4**

Find appropriate assumptions on  $u, G$  such that the policy function  $g(K, a; G)$  defined in the notes is unique.

**Problem 5**

Consider a Rational Expectation Equilibrium. Construct an allocation in sequence from based on the REE and show that it is SME.