# Econ 202A Notes: Macroeconomic Theory I

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## 1 Basic Neoclassical Growth Model (Cass-Koopmans)

**Economy consists of many identical infinitely lived households – all have the same preferences and endowments.**

**Several Interpretations**

1. Representative Agent (Robinson Crusoe)

2. Social Planner

3. Infinitely Lived Family (dynasty)

**One production sector – output produced from capital and labor. Can be consumed or invested. Investment becomes productive capital after one period.**

$$\max \sum_{t=0}^{\infty} \beta^t u(c_t)$$

$$\text{s.t. } \beta \in (0,1)$$

$$c_t + i_t \leq y_t = f(k_t, n_t)$$

$$k_{t+1} \leq (1-\delta)k_t + i_t$$

$$0 \leq n_t \leq 1$$

$$k_0, k_0 > 0$$

**Note that no prices are given here!**

### 1.1 Production Function

$F : \mathbb{R}_+^2 \to \mathbb{R}_+$

1. continuously differentiable

2. homogenous of degree 1 ¡=¿ constant returns to scale

3. strictly quasi-concave

4. F(0,n) = 0

    (a) implies capital is essential

    (b) $F_k$ = marginal product of capital $> 0$

    (c) $F_n$ = marginal product of labor $> 0$

5. $\lim_{k \to 0} F(k,1) = \infty$

6. $\lim_{k \to \infty} F(k,1) = 0$

## 1.2  Utility Function

$u : \mathbb{R}_+ \to \mathbb{R}$

1. bounded - needed for dynamic programming

2. continuously differentiable

3. strictly increasing

4. strictly concave

5. $\lim_{c \to 0} u'(c) = \infty$

**Note: We will use functional forms for $F$ and $N$ for most everything we do in this class.**

## 1.3  Simplifying the Planner's Problem

1. $F_N > 0 work from here$