

## Homework #1D

1. Let  $Y(t)$  denote output as a function of time and let  $L(t)$  denote the labor force as a function of time.
  - a. What is the ratio of output per worker?
  - b. How does it evolve over time?
  
2. Let  $Y(t)$  denote output as a function of time, let  $L(t)$  denote the labor force as a function of time and let  $A(t)$  denote a level labor efficiency, so that  $A(t) \cdot L(t)$  is the “effective labor force.”
  - a. What is the ratio of output per unit of effective labor?
  - b. How does it evolve over time?
  
3. Let  $K(t)$  denote the capital stock as a function of time, let  $L(t)$  denote the labor force as a function of time and let  $A(t)$  denote a level labor efficiency, so that  $A(t) \cdot L(t)$  is the “effective labor force.” Let  $\tilde{k}(t)$  denote the ratio of capital to effective labor.
  - a. What is the ratio of capital per unit of effective labor?
  - b. How does it evolve over time?
  - c. Find the derivative:  $\frac{d \tilde{k}(t)^\alpha}{d t}$ . Hint: Use the chain rule. It makes life a lot easier.