

Macro II (UC3M, MA/PhD Econ)
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Practice problems for final exam 2011
Not to be handed in!

1. **Stochastic neo-classical growth model.** Consider a stochastic growth model in infinite time. Production follows $y_t = z_t F(k_t)$, where z_t is a first-order Markov process and takes values in a finite set $\{z_1, \dots, z_n\}$. Capital formation is standard: $k_{t+1} = z_t F(k_t) + (1 - \delta)k_t - c_t$, where $\delta \in (0, 1)$. The representative agent's objective function is $E_0 \sum_{t=0}^{\infty} \beta^t u(c_t)$.
 - (a) Bring this problem into dynamic-programming form: Find the state, the feasible-set correspondence, the control(s), the return function, the law of motion for the state and write the Bellman equation.
 - (b) Use the envelope theorem to find the first-order condition for investment and interpret it briefly.
 - (c) Now assume that the process for z_t is i.i.d. Show that the state can be collapsed to a single variable now and write the Bellman equation.
2. **McCall search model.** Consider the problem of a worker who lives for infinitely many periods and has linear utility: $E_0 \sum_{t=0}^{\infty} \beta^t w_t$. Every period, the worker draws an i.i.d. wage offer w_t from a distribution with pdf $f(w)$. If she accepts the offer, she gets the respective wage in all subsequent periods. If she rejects, she gets unemployment insurance $\alpha > 0$ in the current period and can draw another wage offer in the next period.
 - (a) Find the value $V_{acc}(w)$ of accepting a wage offer w .
 - (b) Find the value $V_{rej}(w)$ of rejecting a wage offer w .
 - (c) Write the Bellman equation for this problem. What are the state, control(s), feasible-set correspondence, return function and the law of motion?
 - (d) Characterize the optimal policy as far as possible.