ECO 511: Midterm 2 Name: _____

Tuesday May 19, 2020 Student ID: _____

- You have 24 hours.
- There are 2 short answer questions, each with several parts.
- Kick ass! Take names!

1. Consider a model with a single asset b that earns interest rate r. Agents can make their assets negative and borrow, but at most $-\underline{b} : \underline{b} > 0$, e.g. they face an ad hoc borrowing constraint. Income fluctuates $z \in \{z_i\}$ where the conditional probability of z' is given by $\pi(z, z')$.

   Agents preferences are CRRA, $u(c) = \frac{c^{1-\sigma}}{1-\sigma}$ and they discount the future at rate β.

   There is no productive capital in this economy, however, government borrows B from the markets and transfers it back, lump sum, to the households. This is to say, there is no tax, just borrowing from markets and reimbursing households

   (a) (10 pts) Write the problem of the household, defined recursively.

   (b) (10 pts) Define a *stationary recursive* competitive equilibrium.

   (c) (10 pts) Suppose B rises, will this imply more or fewer people on the borrowing constraint? Will the equilibrium interest rate rise or fall?

2. Consider a simple search & matching model in which workers may lose their job with probability δ or may lose their job to "furlough" with probability ξ.

   While in unemployment or furlough, the get flow value b, but it is not taxes from anywhere, so do not worry about clearing the goods market. Given the opportunity to search for a job, workers find employment with probability $\frac{m(s,v)}{s}$, where s is the effective number of searchers. An unemployed worker can search for a job every period but a furloughed worker can only search for a job with probability λ.

   The matching function m has all our usual conditions $m' > 0, m'' < 0$ in both arguments and is constant-returns-to-scale, so we can work with tightness $\theta = \frac{v}{s}$. When employed, worker-firm pairs produce z and wages are determined by Nash bargaining. Again, suppose z fluctuates $z \in \{z_i\}$ where the conditional probability of z' is given by $\pi(z, z')$, though it is now an aggregate shock.

   There is free entry into posting of vacancies, so profits to a vacancy are 0 in equilibrium.

   (a) (10 pts) Define the value function for workers who are employed, unemployed and furloughed

   (b) (5 pts) Define the value functions for firms and vacancies.

   (c) (5 pts) Write the conditions determining market tightness and wages

   (d) (10 pts) Suppose ξ increases and δ decreases such that the overall separation rate from employment stays the same $\hat{\delta} = \delta - \epsilon$ and $\hat{\xi} = \xi + \epsilon$ with $\epsilon > 0$. What will happen to tightness θ. What will happen to the number of vacancies v