1. Consider the following one-sided search model. There is a continuum of agents who each maximize

$$E_0 \sum_{t=0}^{\infty} \beta^t u(c_t),$$

where $\beta = \frac{1}{1+r}$ is the discount factor, with $r > 0$, and $u(\cdot)$ has the same properties as in my notes. An unemployed agent receives an unemployment benefit of $b > 0$ at the beginning of each period, and then receives a wage offer. The wage offer is $w_1$ with probability $\pi$ and 0 with probability $1 - \pi$, where $w_1 > 0$, and $0 < \pi < 1$. When employed, a worker is separated at the end of the period with probability $\delta$, where $0 < \delta < 1$. A worker who receives a wage $w_1$ at the beginning of the period may receive a wage reduction at the end of the period, with probability $\rho$, where $0 < \rho < 1$. Note that an employed worker either keeps his or her job at the wage $w_1$, is separated, or keeps the job with a wage reduction to $w_2$. If a wage reduction occurs, the worker learns at the end of the period that his or her wage will be $w_2 < w_1$ forever, if that job is retained. An employed worker earning a wage $w_2$ has a separation rate of $\delta$. On learning of a wage reduction, the worker has the option of quitting and searching for another job. Note that any new job offers are always at a wage of $w_1$ or 0.

(a) Write down Bellman equations which determine the values (as of the end of the period) of being unemployed, employed at wage $w_1$, and employed at wage $w_2$.

(b) Determine conditions under which an employed worker will or will not quit a job after receiving a wage reduction.

(c) Determine how $b$, $w_1$, $w_2$, $\pi$, and $\rho$ affect an unemployed worker’s decision concerning whether or not to quit when a wage reduction occurs.

(d) Determine how the steady state unemployment rate depends on $b$. 

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Assignment 8

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