ECS550NFB 2017 - Assignment 2

Requirements:
Candidates should submit their solutions via email to `lukas.laffers@gmail.com` by February 13 23:59. The submission must consist of one zipped file named `A2_Lastname.zip` (e.g. `A2_Laffers.zip`) that include all the relevant MATLAB files as well as a short document describing the findings. Any results or figures presented in this document have to be reproducible in a straightforward manner. All MATLAB files must be self explanatory, well commented, easily readable and candidates are strongly encouraged to follow the MATLAB coding standards.

Description: Consider the following simplified dynamic problem presented in Huggett, Mark. "The risk-free rate in heterogeneous-agent incomplete-insurance economies." **Journal of Economic Dynamics and Control** 17.5 (1993): 953-969.

Consumer is interested in maximizing discounted lifetime utility. Her income is random and is either high $y_h = 1$ or low $y_l = 0.1$ and the evolution of income is a Markov Chain with transition matrix

$$P = \begin{bmatrix} 0.925 & 0.075 \\ 0.5 & 0.5 \end{bmatrix}.$$

The consumer holds assets a that give return $r = 0.02$, has CRRA utility function with relative risk aversion coefficient $\gamma = 1.5$ and the discount factor $\beta = 0.95$.

The Bellman equation for this problem is the following

$$V(a, y) = \max_{a_{\min} \leq a'} U\left((1 + r)a + y - a'\right) + \beta E[V(a', y')|y],$$

where a, y stand for current asset allocation and income and a', y' denote the next period quantities and a_{min} is a borrowing constraint.
You can find a MATLAB program that solves this problem in `assignment2.m`. It implements the value function iteration algorithm as we saw in the lecture. In order to get the required precision for the value function of 10^{-6}, it takes 246 iterations.

Your task is to speed it up by implementing the policy function iteration (Howard improvement).