Lecture notes, Oct 27th, 2020

PS 3. Q 1

$$V = \max\left\{\frac{w}{1-\beta},\ c + \beta \mathbb{E} V\right\}$$

$$\frac{w^*}{1-\beta} = c + \beta \mathbb{E} V \quad \Rightarrow w^* = (1-\beta)(c + \beta \mathbb{E} V)$$

CRRA

$$\frac{c^{1-\nu} - 1}{1-\nu} \qquad \nu = 1\ ?$$

$$c^x = \exp(x \ln(c))$$

$$\lim_{\nu \to 1} \frac{c^{1-\nu} - 1}{1-\nu} = \lim_{x \to 0} \frac{c^x - 1}{x} \qquad \frac{0}{0} \text{ L'Hôspital}$$

$$= \lim_{x \to 0} \frac{\ln(c)}{1} = \ln(c)$$

Brute-force Value Function Iteration

$$V(z,k) = \max\{u(c) + \beta \mathbb{E} V(z', k')\}$$

1 2 3 ... n-1 n grid of k

$z \sim P$ matrix, m states

$$V_0(z,k) = 0 \quad \forall z, k$$

$$V_1(z_i, k_j) \qquad \begin{matrix} i = 1 \dots m \\ j = 1 \dots n \end{matrix}$$

$\forall i j$
$$V_1(z_i, k_j) = \max_{k'_p}\left\{u(c) + \beta \sum_{q=1}^{m} V_0(z_q, k'_p) \cdot P(z_i, z_q)\right\}$$

$c(k_j, k'_p)$

enumerate $p = 1, \dots, n$

$$y - k' - (1-\delta)k = c$$

$$V_T \approx V_{T-1} \quad \forall i j$$