Econ202A Homework #1

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1 Question 1

(a)

$$\max \sum_{t=0}^{\infty} 0.99 \log c_t$$
$$\text{s.t. } c_t + k_{t+1} \leq k_t^{0.36}$$
$$k_0 \text{ given}$$

We can formulate this as a dynamic programming problem,

$$V(k_0) = \max_{\{k_{t+1}\}_{t=1}^{\infty}} \sum_{t=1}^{\infty} 0.99^{t-1} \log(c_t)$$

Starting from $v_0(k) = 0$,

$$\max \log c_t \text{ s.t. } c_t \leq k_t^{0.36} - k_{t+1}$$
$$\implies c = k^{0.36}$$

Now iterate on the Bellman equation.

$$v_1(k) = 0.36 \log k$$
$$c_2 = \frac{1}{1 + 0.99 \cdot 0.36} k^{0.36}$$
$$k' = \frac{0.99 \cdot 0.36}{1 + 0.99 \cdot 0.36} k^{0.36}$$

Take the limit as $t \to \infty$...

$$c = (1 - 0.99 \cdot 0.36) k^{0.36}$$
$$k_{t+1} = 0.99 \cdot 0.36 k^{0.36}$$

(b)

$$\bar{k} = 0.99 \cdot 0.36 k^{0.36}$$
$$\bar{k}^{0.64} = 0.3564$$
$$\bar{k} = 0.19948$$