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Problem 1.

(1)

Solution: The Langrangian is as follows:

$$L = \sum_{t=0}^{\infty} \beta^t u(c_t) + \sum_{i=0}^{\infty} \lambda_t (w_t - c_t - w_{t+1})$$

with the following FoCs

$$\begin{aligned} [c_t] \quad & \beta^t u(c_t) = \lambda_t \\ [\lambda_t] \quad & w_t = c_t + w_{t+1} \\ [w_{t+1}] \quad & \lambda_{t+1} = \lambda_t \end{aligned}$$

We can see that we can derive the Euler equation,

$$\begin{aligned} \beta^{t+1} u'(c_t) &= \beta^t u'(c_t) \\ \beta u'(c_{t+1}) &= u'(c_t) \end{aligned}$$

□

(2)

Solution: We aim to extend the findings from the Finite Horizon model to the Infinite Horizon Model. Consider the following version of the finte horizon model. □