Homework 4.

1. Apply the finite element method to find the optimal consumption function $c(k)$ that solves the deterministic growth model:

$$\max \sum_{t=0}^{\infty} \beta^t \log\left(c_t\right)$$
$$\text{s.t. } c_t + k_{t+1} - (1 - \delta)\, k_t = A k_t^{\theta}.$$

Use $\delta = 1$ as a test case.

2. Apply the finite difference method to find the optimal consumption function $c(k)$ that solves the deterministic growth model in continuous time:

$$\max \int_0^{\infty} e^{-\rho t} \log\left(c\right)\, dt$$
$$\text{s.t. } dk = \left(A k^{\theta} - \delta k\right) dt.$$

As in (1), use $\delta = 1$ as a test case.

3. Compare the optimal policy functions to that of the nested case in Homework 1 with fixed technology $(z_t = \bar{z})$, inelastic labor $(\psi = 0)$, and no growth $(\gamma_n = \gamma_z = 0)$.

4. Compare time series of the three sets of results starting from $k_0 = 1/2 k_{ss}$.