Homework4 - Macroeconomics

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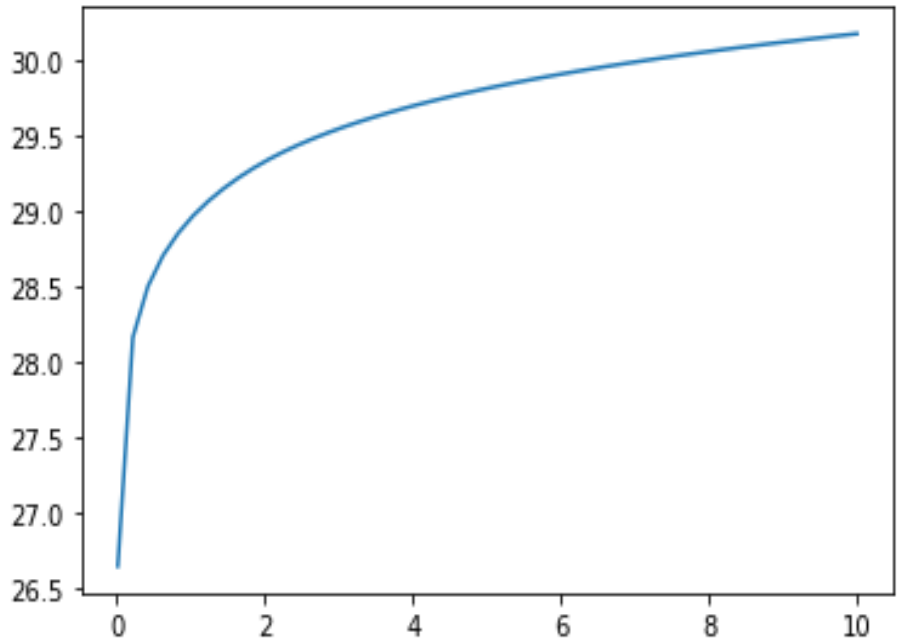
1 Exercise 1

1.1 Bruce force iteration

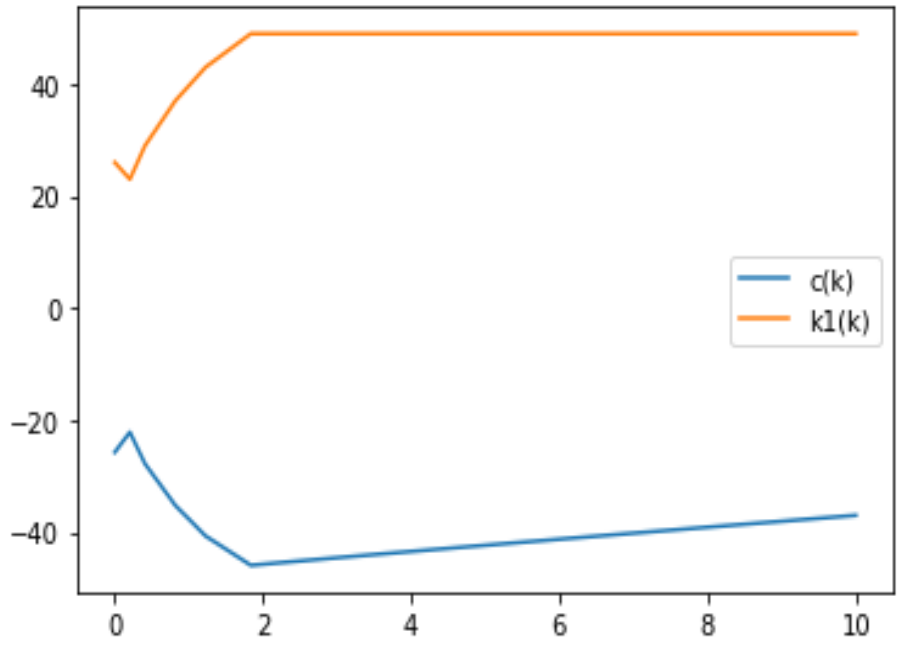
1. Set the grid $k_{min} > 0$ and $k_{max} >= steadystate$
2. Guess a Indirect Utility Function V.
3. Check if consumption is positive. Along the definition condition:
   $y(k_t) + (1 - \delta) * k_t) > k_{t+1}$. For all k's this condition does not hold, I put a very negative value -10000.
4. Computing the X[k_i,k_j] values for all k's the positive consumption holds.
5. Value Function V^1 is provided by selecting the maximising value at position k_j for each row k_i.
6. Checking if the reached Value Function presents the optimal path by comparing the new Value Function with the previous one.

You will find two codes in python to solve for this exercise. The first one is not running yet, but shall be improved shortly as it follows the steps above. The second code was deduces from Albert's template code. This one is running but doesn't allow the sequential intervention required for the following exercises.

Title: Value Function $V(x)$



Title: Policy functions



1.2 Monotonicity

This section follows the mentioned steps above up until step 4

5 For each X[k_i,k_j] where j¡i, we know by monotonicity that respective policy function will reveal smaller values: $g(k_i) <= g(k_j)$ if i¡j.

6 Value Function V^1 is provided by selecting the maximising value at position k_j for each row k_i. This step is supposed to run faster as it considers a matrix with reduced amount of entries.

6 Checking if the reached Value Function presents the optimal path by comparing the new Value Function with the previous one.

1.3 Concavity

This section follows the mentioned steps above up until step 5

6 Value Function V^1 is provided by selecting the maximising value at position k_j for each row k_i. Because the capital function is strictly concave in k_j, we know that any entry in the X-matrix for $m(i,j) + \beta * V_j^s$¿$m(i,j+1) + \beta * V_{j+1}^s$ than $m(i,j+1) + \beta * V_{j+1}^s$¿$m(i,j+2) + \beta * V_{j+2}^s$ Hence, we don't have to consider all values for the row k_i in the X-matrix after $m(i,j+1) + \beta * V_{j+1}^s$.

6 Value Function V^1 is provided by selecting the maximising value at position k_j for each row k_i. This step is supposed to run faster as it considers a matrix with reduced amount of entries.

6 Checking if the reached Value Function presents the optimal path by comparing the new Value Function with the previous one.

1.4 Local search

TBS

1.5 Concavity and Monotonicty

TBS

1.6 Howards's Search