Class 5, Problem Set 1

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Introduction to Programming and Numerical Analysis

Plan for today

1. Where are we in the course?
2. Brush up on important concepts/syntax
    - Interactive figures
    - Solving an exchange model
3. GitHub team repo
4. Work on PS2

Where are we

...

1. DataCamp
2. PS1
3. **PS2**
4. Work on your inaugural project - come prepared

...

Interactive figures

1. Create function that creates a plot
2. Use ipywidget: `widget.interact(function, argument in function)`

Interactive figures

1. Create function that creates a plot
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In [1]:

```
import ipywidgets as widgets
import matplotlib.pyplot as plt
import numpy as np
import OLG_trans as OLG
```

```
<frozen importlib._bootstrap>:228: RuntimeWarning: scipy._li
b.messagestream.MessageStream size changed, may indicate bin
ary incompatibility. Expected 56 from C header, got 64 from
PyObject
```

In [2]:

```
# 1. Create function that creates a plot
def fig(rho):
    """
    Args:
        rho(float): Timepreference parameter
    Returns:
        Plot of OLG transition curve
    """
    # parameters
    alpha = 1/3
    rho = rho
    n = 0.2

    # return values to be plotted
    k_1, k_2 = OLG.transition_curve(alpha,rho,n,T=1000,k_min=1e-20,k_max=6)

    fig = plt.figure(figsize=(9,9))
    ax = fig.add_subplot(1,1,1)
    ax.plot(k_1,k_2, label="Transition curve")
    ax.plot(k_1,k_1, '--', color='grey',label="45 degree")
    ax.set_xlabel('$k_t$')
    ax.set_ylabel('$k_t+1$')
    ax.set_title('Transition curve')
    ax.legend()
    ax.set_xlim([0,0.2])
    ax.set_ylim([0,0.2]);
    return
```

In [3]:

```
# 2. Use ipywidget
import ipywidgets as widgets
widgets.interact(fig
                 , rho = widgets.FloatSlider(description='rho', min=0, max=16, step=0.01, value=0.5))
```

```
interactive(children=(FloatSlider(value=0.5, description='rho', max=16.0, step=0.01), Output()), _dom_classes=…
```

Out[3]:

```
<function __main__.fig(rho)>
```

Customize your plot

- `IntSlider` discrete version of `FloatSlider`
- `Dropdown` creates a dropdown menu of things to choose from
- ... And so on...

NB: Check documentation

Solving an exchange model

Intiution: Solving for the equilibirum in an exchange model we utilize Walras' law i.e., excess demand must be zero in equilibrium for given prices. Thus, we construct and infinite loop that iterate over prices until excess demand is close to zero (0.00000001).

Pseudo code: 1) Calculate excess demand for given price 2) Check if the excess demand is approximately zero 3) If true terminate else update price 4) Continue until excess demand is zero

GitHub team repo

- Each team must have a repo that has been created trough this link
- **One** member creates the repo and invites the other

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