

# D2\_Exercises

Kwon do yun

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## P. 17

```
import numpy as np
P = np.array([0.7,0.3,0.5,0.5]).reshape(2,2)
R = np.array([1.5,1.0]).reshape(2,1)
gamma = 0.9
v = np.dot(np.linalg.inv(np.identity(2)-gamma*P),R)
print(v)
```

```
## [[13.35365854]
##  [12.74390244]]
```

## The full iteration process (P. 23)

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

P = np.array([0.7,0.3,0.5,0.5]).reshape(2,2)
R = np.array([1.5,1.0]).reshape(2,1)
gamma = 0.9
epsilon = 10**(-8)

v_old = np.zeros((2,1))
v_new = R + np.dot(gamma*P,v_old)
results = v_old.T
results = np.append(results,v_new.T,axis=0)

while np.max(abs(v_new-v_old))>epsilon:
    v_old = v_new
    v_new = R + np.dot(gamma*P,v_old)
    results = np.append(results,v_new.T,axis=0)

results = pd.DataFrame(results,columns=['coke','pepsi'])
print(results.head(n=7))
```

```
##      coke      pepsi
## 0  0.000000  0.000000
## 1  1.500000  1.000000
## 2  2.715000  2.125000
## 3  3.784200  3.178000
## 4  4.742106  4.132990
```

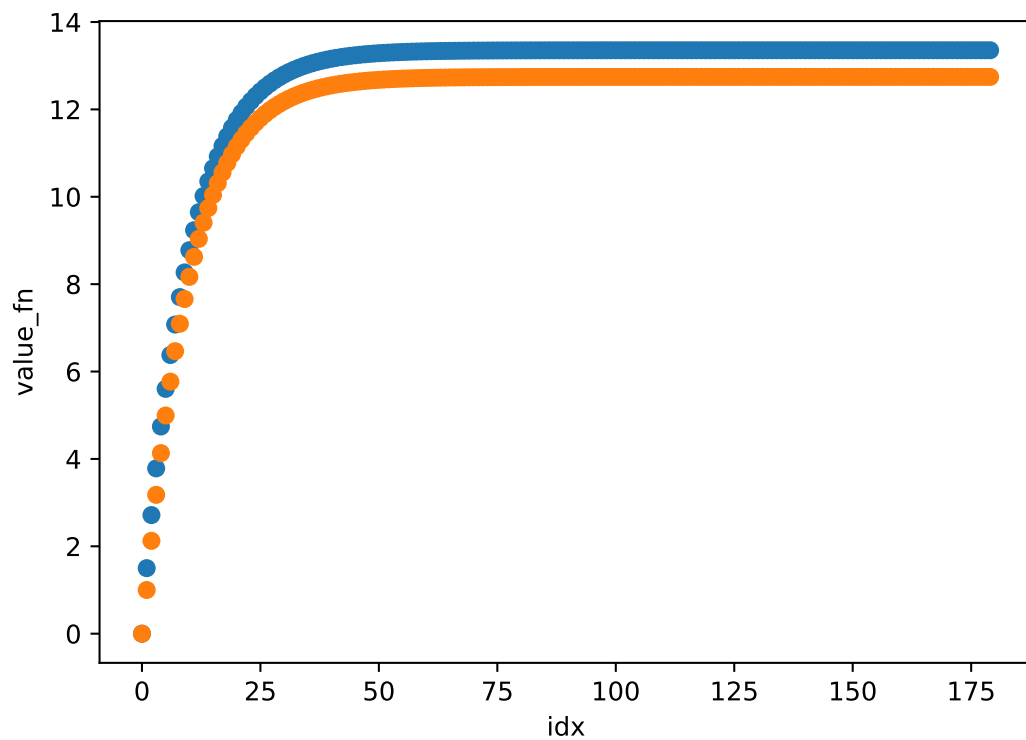
```
## 5  5.603434  4.993793
## 6  6.378488  5.768752
```

```
print(results.tail(n=7))
```

```
##           coke      pepsi
## 173  13.353658  12.743902
## 174  13.353658  12.743902
## 175  13.353658  12.743902
## 176  13.353658  12.743902
## 177  13.353658  12.743902
## 178  13.353658  12.743902
## 179  13.353658  12.743902
```

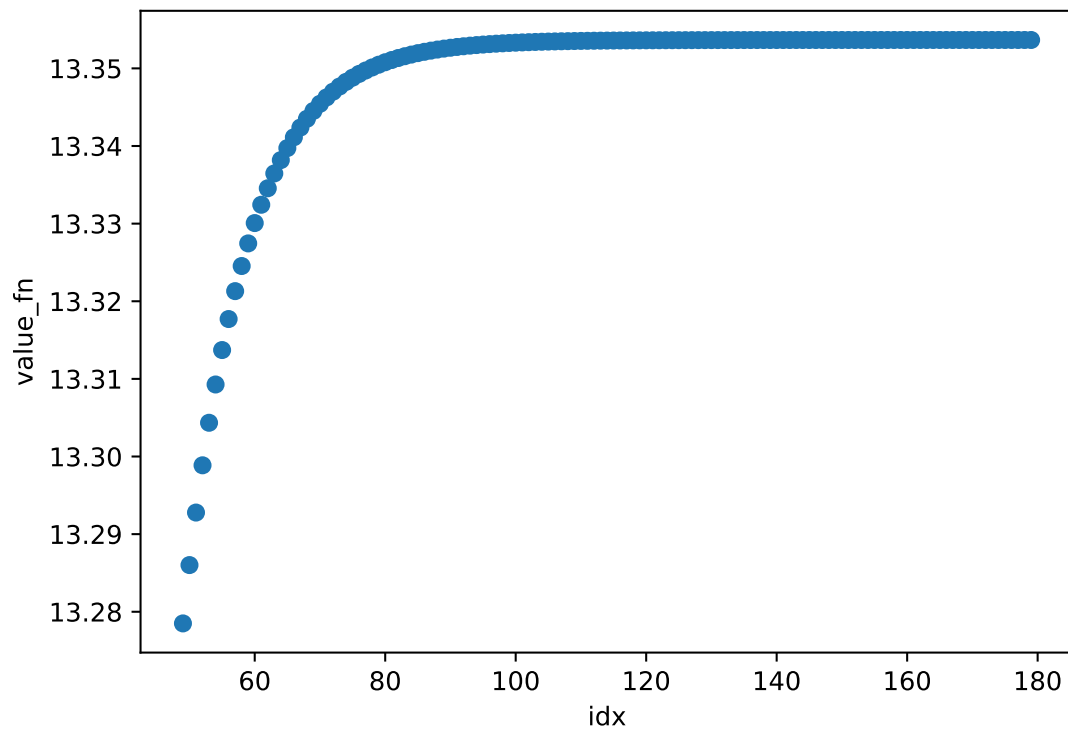
## Graph (P. 25)

```
plt.scatter(results.index, results['coke'], label='coke')
plt.scatter(results.index, results['pepsi'], label='pepsi')
plt.xlabel('idx')
plt.ylabel('value_fn')
plt.show()
```

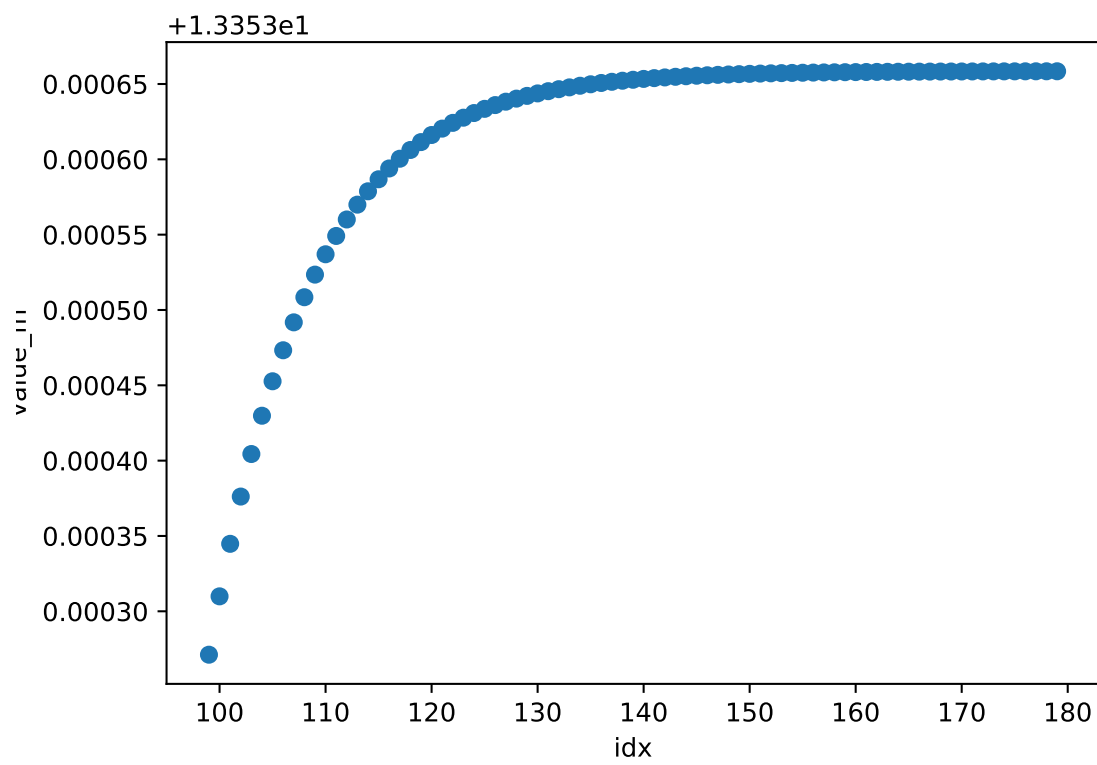


## P.27

```
plt.scatter(results.index[49:],results['coke'][49:], label='coke')
plt.xlabel('idx')
plt.ylabel('value_fn')
plt.show()
```



```
plt.scatter(results.index[99:],results['coke'][99:], label='coke')
plt.xlabel('idx')
plt.ylabel('value_fn')
plt.show()
```



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