# Notebook

February 19, 2019

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### 2.0.1 3. Jump Up, Fall Down

Consider a Markov Chain with state space$0, 1, 2, \ldots, 12$and transition behavior given by: - For$0 \leq i \leq 11$, the distribution of$X_{n+1}$given$X_n = i$is uniform on$i + 1, i + 2, \ldots, 12$. -$P(12, 0) = 1$.

**a)** Complete the cell below to construct the transition matrix of this chain and assign it to the name `jump_fall`.

In [8]:
```
#Answer to 3a

s = np.arange(13)
def transition_probs(i, j):
    if i == 12:
        if j == 0:
            return(1)
        else:
            return(0)
    else:
        if j > i:
            return(1 / (12 - i))
        else:
            return(0)
jump_fall = MarkovChain.from_transition_function(s, transition_probs)
jump_fall
```

Out[8]:
```
      0         1         2         3         4         5         6         7   \
0   0.0  0.083333  0.083333  0.083333  0.083333  0.083333  0.083333  0.083333
1   0.0  0.000000  0.090909  0.090909  0.090909  0.090909  0.090909  0.090909
... Omitting 22 lines ...
10  0.000000  0.000000  0.000000  0.500000  0.500000
11  0.000000  0.000000  0.000000  0.000000  1.000000
12  0.000000  0.000000  0.000000  0.000000  0.000000
```

In [10]:
```
#Answer to 3c
jump_fall.steady_state()
```

Out[10]:
```
Value | Probability
0     | 0.243712
1     | 0.0203093
... Omitting 5 lines ...
8     | 0.0487423
9     | 0.0609279
... (3 rows omitted)
```

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In [ ]: