4nodes_3

April 12, 2019

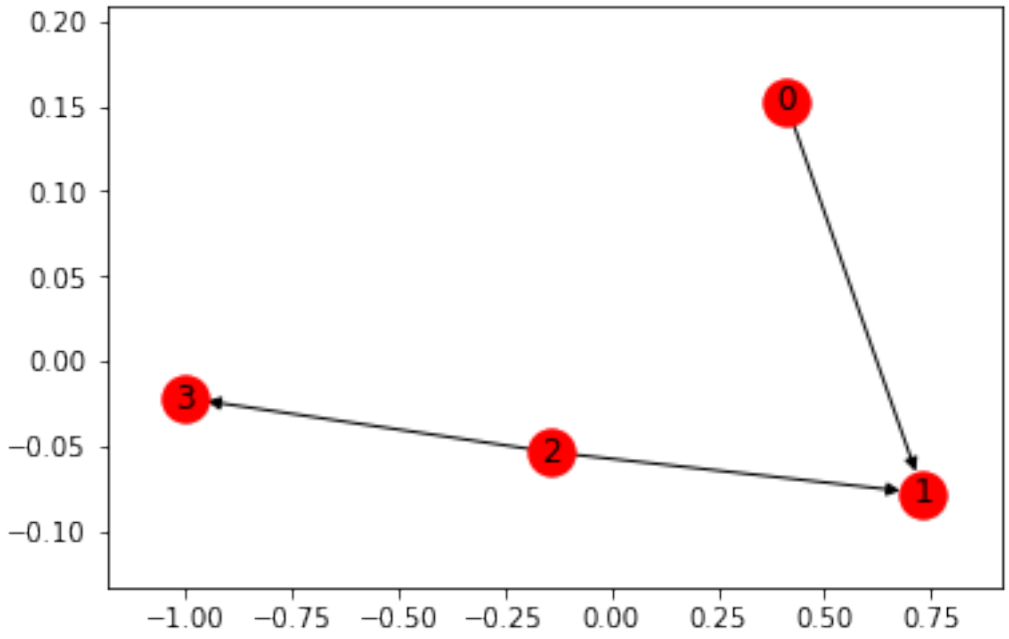
0.1 4 nodes

In [1]:
```
%run ../imports.py
```

In [2]:
```
G = nx.DiGraph()
```

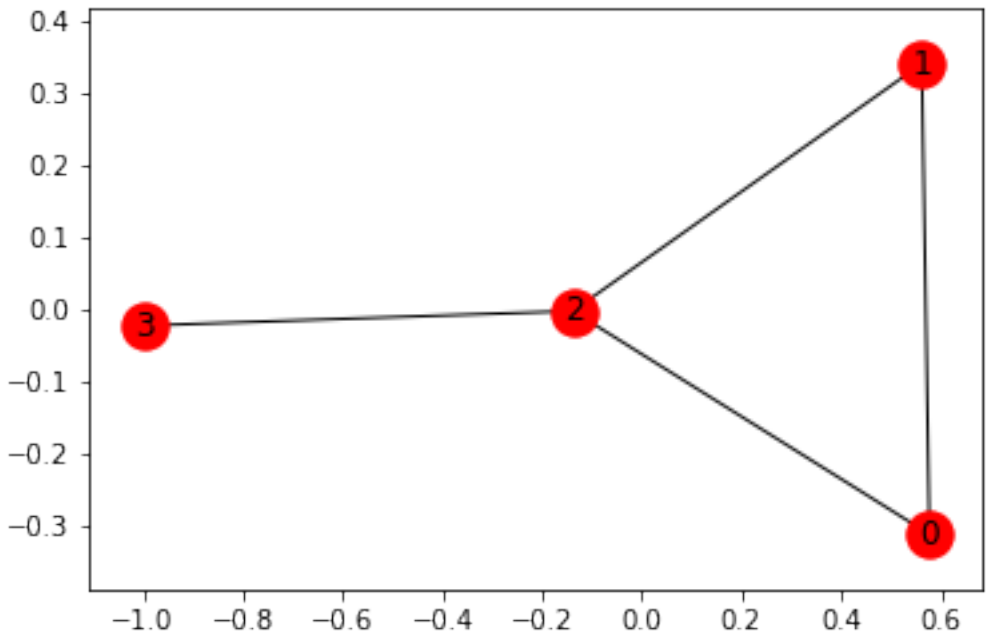
In [3]:
```
G.add_nodes_from([0,1,2,3])
G.add_edges_from([
    (0,1),
    (2,1),
    (2,3)
])
```

In [4]:
```
nx.draw_networkx(G)
```



In [5]:
```
L = out_degree_laplacian(G)
np.linalg.matrix_rank(L)
```

```
Out[5]: 2

In [6]: Q = orth_matrix(L).T
        rL = np.matmul(Q, np.matmul(L, np.transpose(Q)))
        sigma = solve_lyapunov(rL, np.identity(np.linalg.matrix_rank(L)))
        x = 2*np.matmul(np.transpose(Q), np.matmul(sigma, Q))
        eqL = np.linalg.pinv(x)

In [7]: Q

Out[7]: matrix([[ 0.09200377, -0.48173799,  0.77946844, -0.38973422],
                [-0.73279591,  0.55980626,  0.3459793 , -0.17298965]])

In [8]: sigma

Out[8]: array([[ 0.26020852, -0.05618332],
               [-0.05618332,  0.49736724]])

In [9]: eqL

Out[9]: matrix([[ 0.54, -0.42, -0.24,  0.12],
                [-0.42,  0.66, -0.48,  0.24],
                [-0.24, -0.48,  1.44, -0.72],
                [ 0.12,  0.24, -0.72,  0.36]])

In [10]: posG, negG = separate_graphs(eqL)

In [12]: nx.draw_networkx(posG)
```



In [13]: nx.draw_networkx(negG)