Demonstration of the Rogers/Veraart Algorithm

We start by initializing a simple system of three nodes:

```
vecE = [10;5;5];
matL = [0 30 0;5 0 20;10 0 0];
```

We see that, before clearing, only the first node is in default:

```
vecPbar = sum(matL,2);
matPi = matL ./ repmat(vecPbar,1,length(vecE));
vecEquity = vecE + matPi'*vecPbar - vecPbar;

disp([{'Equity before clearing' 'Defaulted'};
    num2cell([vecEquity vecEquity < 0])])
```

```
'Equity before clearing'    'Defaulted'
[                     -5]    [        1]
[                     10]    [        0]
[                     15]    [        0]
```

We first compute the clearing payment vector assuming full recovery on external and interbank assets, and we see that there are no contagious defaults:

```
vecPayments = calcPayments(vecE,matL,1,1);
vecEquityNew = vecE + matPi'*vecPayments - vecPbar;

disp([{'Equity after clearing' 'Defaulted'};
    num2cell([vecEquityNew vecPayments < vecPbar])])
```

```
'Equity after clearing'    'Defaulted'
[                    -5]    [        1]
[                     5]    [        0]
[                    15]    [        0]
```

We now assume a 60% haircut on external assets, and we see that now another node is pushed into default through contagion losses:

```
vecPayments = calcPayments(vecE,matL,0.4,1);
vecEquityNew = vecE + matPi'*vecPayments - vecPbar;

disp([{'Equity after clearing' 'Defaulted'};
    num2cell([vecEquityNew vecPayments < vecPbar])])
```

```
'Equity after clearing'    'Defaulted'
[                    -6]    [        1]
[                    -2]    [        1]
[                    11]    [        0]
```

We can now also simulate payoffs under stochastic paths for external assets, seeing that the first two agents repay their liabilities in full in some paths and default in the median path, the third agent never defaults in this model.

```
vecMu = [0.3;0.1;0.1];
matCovariance = [1 0 0;0 1 0;0 0 1];
numSimulations = 1000;
matValuations = calcValuations(vecE,vecMu,matCovariance,matL,numSimulations,0.4,1);
boxplot(matValuations')
```