# Homework 02 - Network Science

Gabriel Luciano Gomes (265673)

October 5, 2020

## 1   Exercise

In this exercise, was asked to create a random network with 10000 nodes and the linking probabilty
p = 0.0005 and analyze some properties. And, for this assignment networkx library, from Python,
was used to create the Graph, compute and speed up the results.

The following code was used to build the graph.

```python
from networkx import nx


N = 10000 # number of nodes
p = 0.0005 #probability of linking

# building the Graph
G = nx.gnp_random_graph(N, p)
```

As networkx is used in this assignment, tasks can be easily executed with the following blocks
of code.

### 1.1   Compute the number of connected components

```python
[IN] ncc = nx.number_connected_components(G)
[IN] print("Number of connected components:", ncc)
[OUT] Number of connected components: 82
```

### 1.2   Compute the size of the giant component

```python
[IN] cc = nx.connected_components(G)
[IN] sortedComponents = sorted(cc, key=len, reverse=True)
[IN] gc = G.subgraph(sortedComponents[0])
[IN] print("Size of the giant component:", gc.number_of_nodes())
[OUT] Size of the giant component: 9915
```

### 1.3   Compute the average distance in the giant component

This exercise requires the variable 'gc' defined in the previous exercise

```python
[IN] ad = nx.average_shortest_path_length(gc)
[IN] print("Average distance in the giant component:", ad)
[OUT] Average distance in the giant component: 5.904406193821581
```