NETWORK MODELLING, VISUALIZATION AND ANALYSIS II
Homework

Handling details:

Deadline: 31st October 2013 (11:59 PM)

Send a PDF with your results by **e-mail** to mbleda@cipf.es or martableda@gmail.com. Include your full name, please.

Exercise:

1. **Simulate** 3 networks:
   a. Erdös-Rényi (n=1000, p.or.m=2/1000, type="gnp")
   b. Watts-Strogatz (dim=1, size=1000, nei=4, p=0.5)
   c. Barabási-Albert (n=1000)

2. For these 3 networks, **perform a random and a targeted attack** (directed to the nodes with higher degree) damaging progressively the 0%, 0.1%, 0.2%, 0.3%, 0.4%, 0.5%, 0.6%, 0.7%, 0.8%, 0.9%, 1%, 1.5%, 2% and 2.5% of the nodes.

   TIP: In R, the function `sample` returns N random elements from the original set. The function `order` can be used to select the nodes with higher degree.

3. Study the variability of the following **parameters**:
   a. Average degree
   b. Diameter
   c. Size of the giant component
   d. Betweenness

   TIP: The size of the giant component can be obtained using the function `clusters(g)` which returns a list of information. Inside this list, the parameter `csize` contains a vector with the sizes of all components found in the network, the largest one is the number we are looking for.

   The global betweenness can be obtained accessing to the `centralization` parameter of the function `centralization.betweenness(g)`.

4. Create a **plot** summarizing this information and **comment** your results briefly. Send this information in PDF by e-mail. Here you have an example of a plot summary: