# Big Data Analytics

**ESSEC**

Home work 5: Link Analysis

1. (**Exercise 5.1.1 MMDS book)** Compute the PageRank of each page in Fig. 5.7, assuming no taxation.

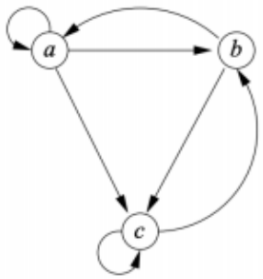


Figure 5.7: An example graph for exercises

2. (**Exercise 5.1.2 MMDS book)** Compute the PageRank of each page in Fig. 5.7, assuming taxation with $\beta = 0.8$

3. (**Exercise 5.2.1 MMDS book)** Suppose we wish to store an $n \times n$ Boolean matrix (0 and 1 elements only). We could represent it by the bits themselves, or we could represent the matrix by listing the positions of the 1's as pairs of integers, each integer requiring $\log_2(n)$ bits. The former is suitable for dense matrices; the latter is suitable for sparse matrices. How sparse must the matrix be (i.e., what fraction of the elements should be 1's) for the sparse representation to save space?

4. (**Exercise 5.2.2 MMDS book)** Using the method of Ex 3, represent the transition matrices of the graph from Figure 5.7.