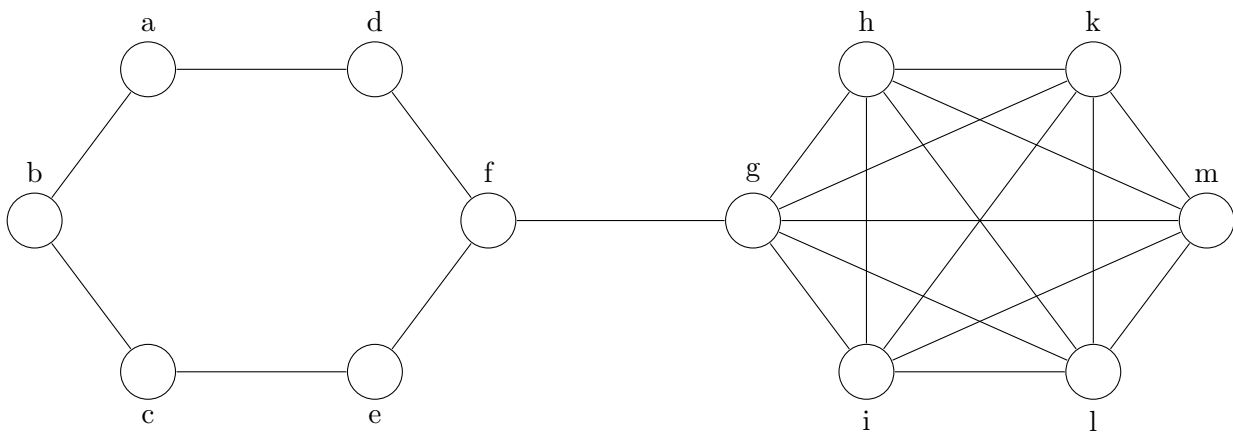


20th-23rd May 2019

## ASSESSMENT

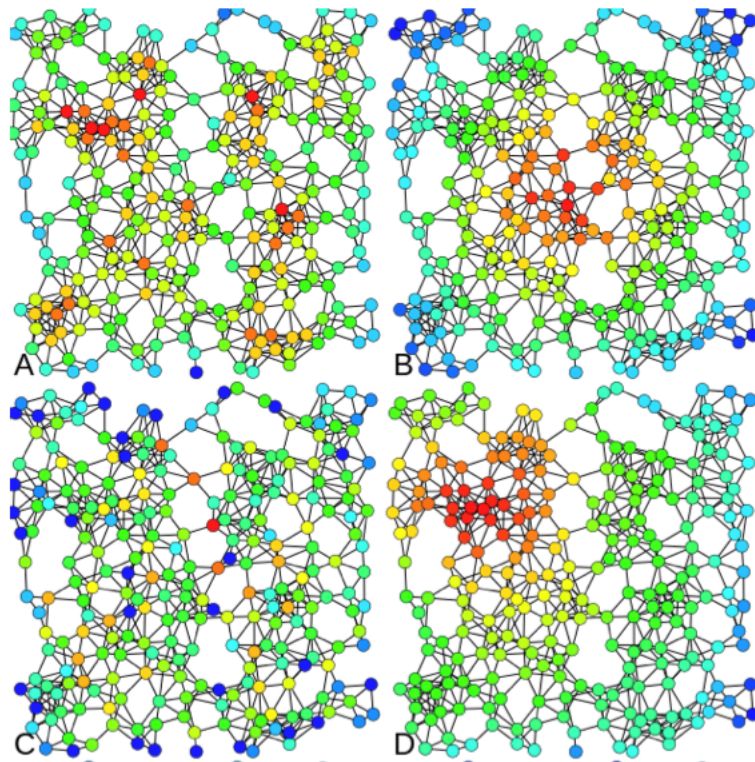
Please submit the final document as a pdf file & R script (just not a Word document). If you have any questions about the exam, do not hesitate to contact me at p.matos@ub.edu.

### QUESTION 1



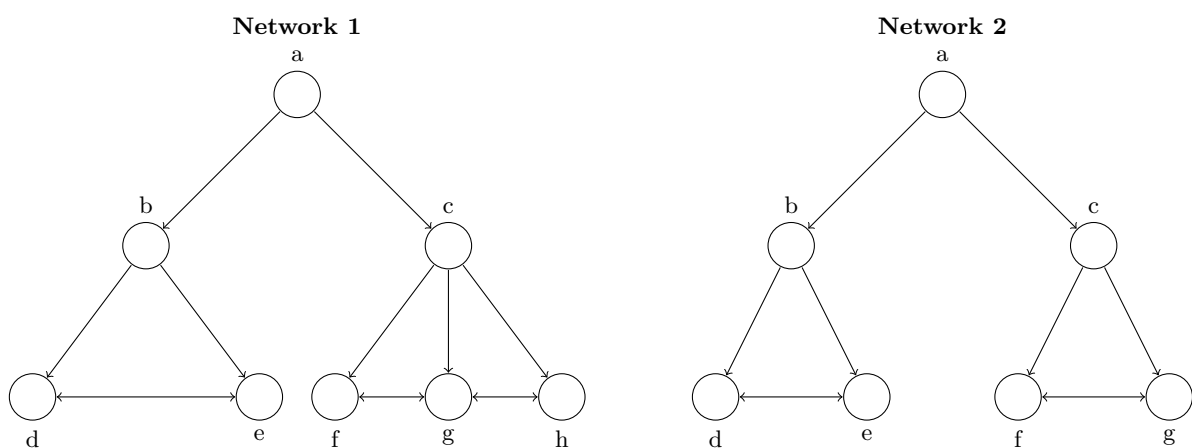
- 1.1 Write down the adjacency matrix for this network;
- 1.2 Write down the nodelist representation of this network;
- 1.3 Which node(s) have the highest degree centrality?
- 1.4 Which node(s) have the highest betweenness centrality?
- 1.5 What centrality measure would you choose to characterise this network? Why?
- 1.6 How many components does this network have? What is the diameter of this network?
- 1.7 Which measure would you choose to represent the level of cohesion of this network: F-measure of fragmentation or Distance-weighted fragmentation? Explain why.

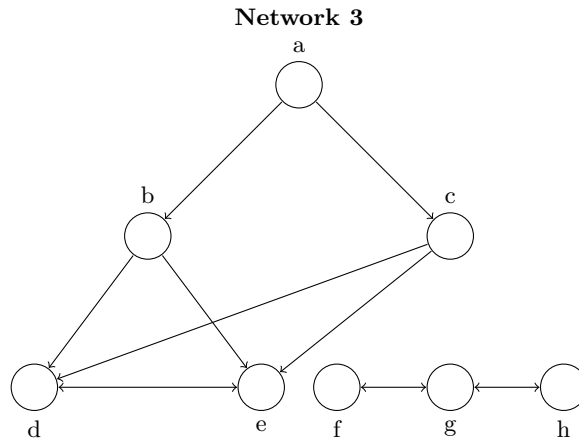
## QUESTION 2



2.1 Which centrality measures would you associate with the coloration of vertices in each of the networks above (A, B, C and D)? (Note: the colouring scale applied varies from blue (least important/lowest score on centrality measure) to red (most important/highest score on centrality measure))

## QUESTION 3

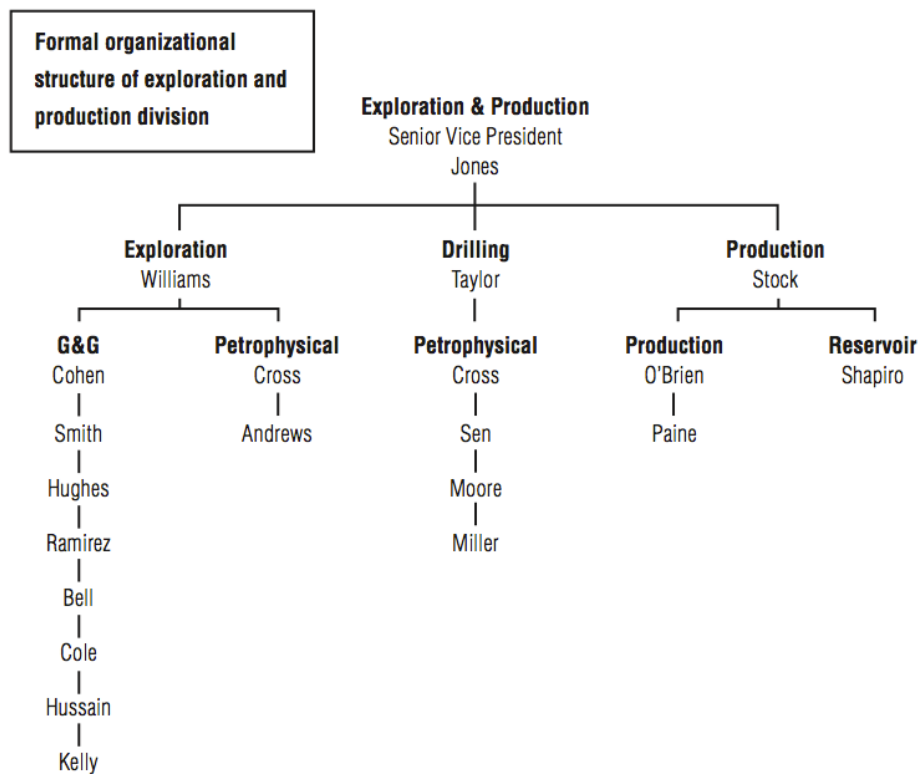


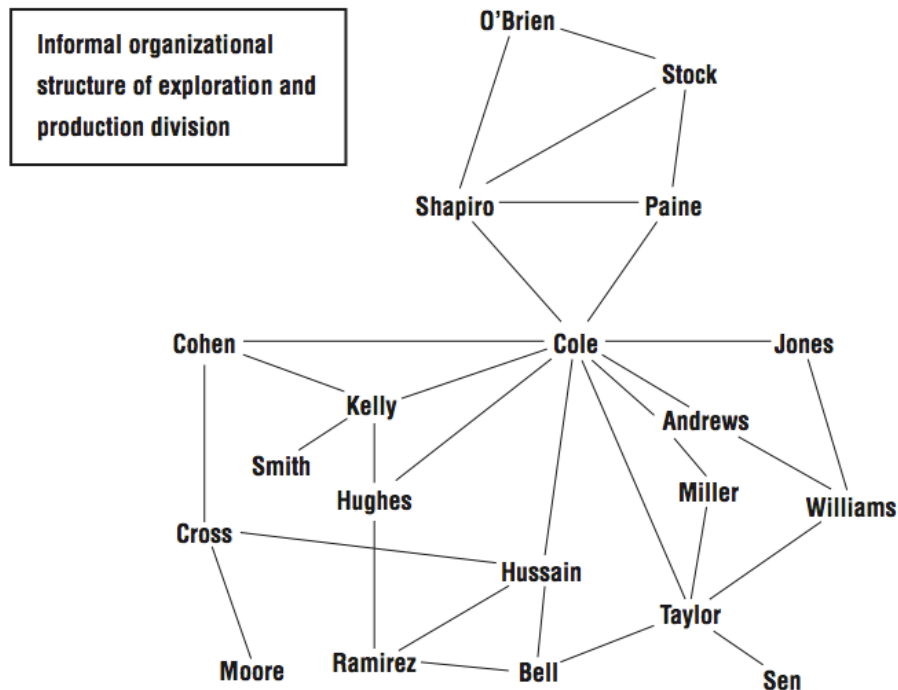


3.1 Consider nodes **b** and **c**. For each network, what equivalence model (structural, regular, auto-morphic) would you use to assess the equivalence of those two nodes? Why?

3.2 What kind of relationships do you think are represented in each network? How does the type of relationship relates to the equivalence model that should be used to better understand the different roles played in the network?

#### QUESTION 4





**Figure 1: Formal vs. informal structure in a petroleum organization.<sup>4</sup>**

The figures above represent the organisational chart and an informal organisation network of the top 20 Executives within the exploration and production division of a Petroleum organisation.

4.1. Identify three features of the informal network (second figure) and explain how can they be problematic for the overall functioning of this petroleum company.

4.2 According to Gould & Fernandez concepts of brokerage roles (day 2 of our course), what role does Cole take on for the majority of his interactions?

4.3. Based on Burt's idea of structural holes, who is the most important person in the informal network? Is this person also the most important Executive according to the formal organisational chart (first figure)?

### QUESTION 5

Below you will find the codebook for a database on survey data from two villages located in the rural Teso region of Uganda, approximately 10 kilometers north of the Soroti town: Abalang in Arapai Parish, and Mugana in Aloet Parish. The two villages are approximately two kilometers apart at their closest points. They are demographically similar but differ in one key respect: Abalang is ethnically and linguistically homogeneous and Mugana is heterogeneous. Both villages have approximately 1,400 residents, both are rural, and both are located in the same geographic region of Uganda. Mugana is a little wealthier and has more Catholic residents. The starkest difference between the two villages is in ethnic composition: measured as ethnolinguistic fractionalization, Mugana, at .48, is much more ethnically diverse than Abalang, at .08. Measured another way, the size of the second largest ethnic group in Mugana is 36% of the population, and

in Abalang it is only 4% of the population.

Respondents in these villages were asked for a variety of attributes and social relations, where they have named up to 5 people in their ego-networks.

Using this data, construct networks for any 2 of the following relations: (1) sharing a meal with; (2) visiting at home; (3) discussing politics; (4) sharing a secret. Create each of the two networks separately for the villages of **Abalang** and **Mugana**. You should end up with 4 networks, depicting the two relations you chose for each village.

Hint: the dataset is organised such that each Ego names up to 5 alters. This is a typical nodelist structure. Try subsetting the data for each relation-village and converting into a network/igraph object. If you have any difficulties, don't hesitate to contact me.

Using any of the network and node-level metrics we discussed, compare the two villages in each of the relationships you chose and discuss the following:

1. are these networks equally cohesive across the two villages;
2. what are the main forces driving or hampering dyadic and whole network cohesion in each village?

#### **Codebook:**

- **Ego:** String, anonymized from Ugandan and Christian name of respondent;
- **CoarseVlg:** Factor, village where respondent lives: ABALANG or MUGANA;
- **Gender:** Factor, F or M observed by enumerator.
- **Age:** Numeric, age of respondent
- **CoarseLangFam:** Factor, what language respondent speaks with family: ATESO or KUMAM.
- **Educ:** Factor, choice circled by enumerator based on respondent's answer, highest level of education completed
  1. No formal schooling
  2. Informal schooling only (including Koranic schooling)
  3. Some primary schooling
  4. Primary school completed
  5. Some secondary school/ high school
  6. Secondary school/ high school completed
  7. Post-secondary qualifications, other than university, e.g. diploma or degree from technical or college
  8. Some university
  9. University completed
  10. Post-graduate
- **Relig:** Factor, what religion respondent identifies with.

1. Catholic
2. Anglican
3. Muslim
4. Pentecostal
5. Other

- **JobType:** Factor, type of job, takes values:
  1. No job that pays a cash income, not looking for one
  2. No job that pays a cash income, looking for one
  3. Has job that pays a cash income, part-time
  4. Has job that pays a cash income, full time
- **Tribe:** Character, respondent's tribe. Main tribes of interest in the Ethnic Networks analyses are Ateso and Kumam.
- **CoarseClan:** String, name of respondent's clan.
- **Secret1...Secret5:** String, anonymized name of adult (up to 5) who you'd trust to keep your secret, in order given.
- **Meal1...Meal5:** String, anonymized name of adult (up to 5) outside homestead with whom shared meal or drink this past week, in order given.
- **Visit1...Visit5:** String, anonymized name of adult (up to 5) whose homes visited this past week, including just passing by, in order given.
- **Pol1...Pol5:** String, anonymized name of adult (up to 5) with whom most likely to discuss national politics, in order given.