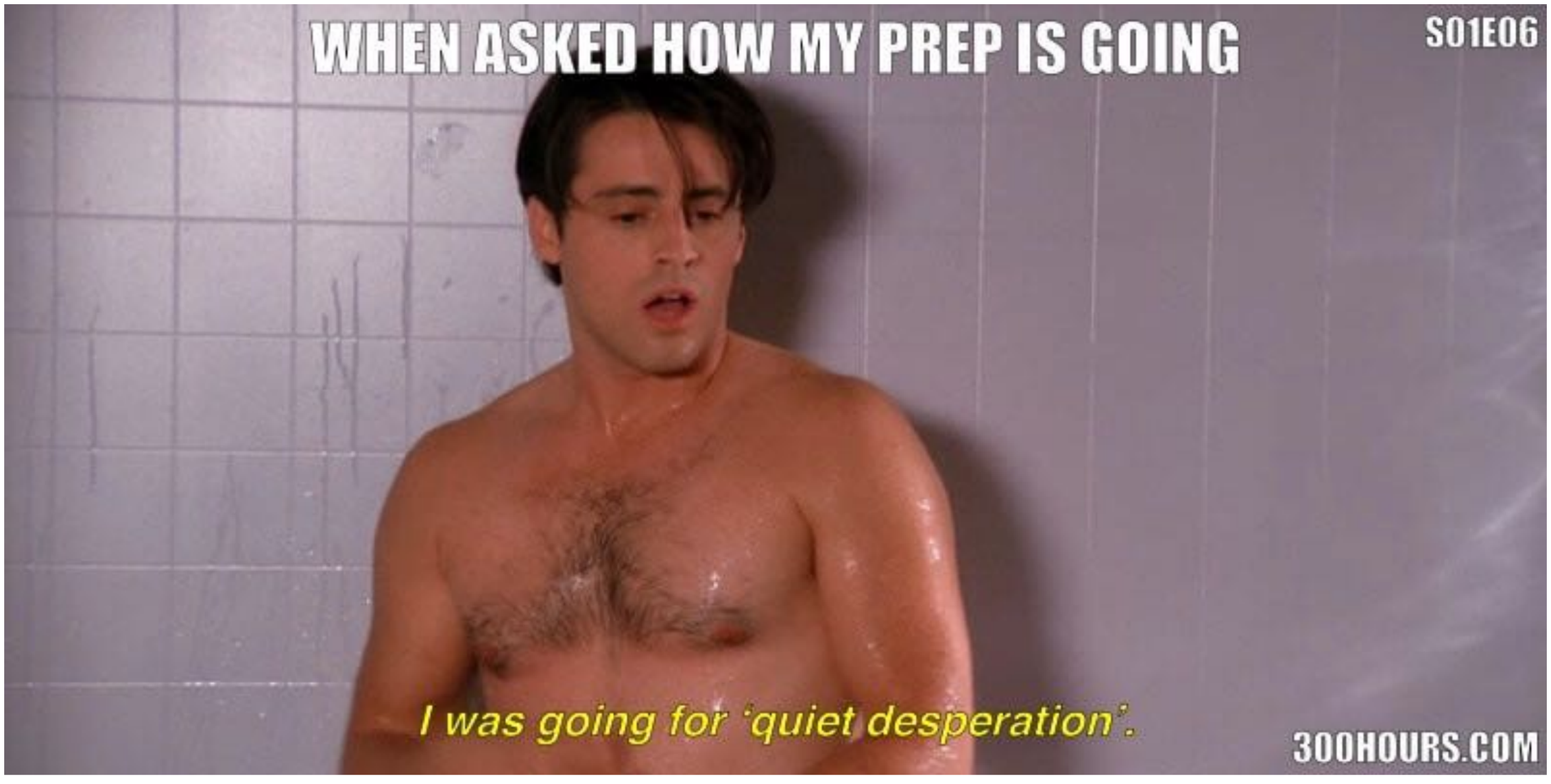
Mock exam and mid-course revision



LEARNING OUTCOMES

Revise the course material

Prepare for the exam

PREPARATION TIPS

Do all the tutorials.

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Do all the tutorials.

Discuss the tutorials with others.

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Do all the tutorials.

Discuss the tutorials with others.

Don’t memorise concepts, but understand them!

EXAM TIPS

Read. The. Text. Well.

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Don’t just copy/paste definitions, understand the context.

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Keep in mind I’d love for all of you to pass! (i.e. don’t overcomplicate things).

EXAM TIPS

But seriously READ THE TEXT WELL.

CONTEXT

Congratulations!
You have been just hired by **DBBA Investments**, a prominent international investment firm.

CONTEXT

To fortify their readiness for future crises, DBBA Investment is keen on unraveling the dynamics of **global markets during the 2019-2020 period**, especially the **COVID Stock Market Crash**.

Your job is to analyse the **correlation network** among the primary stock market indices of the top 36 global economies (e.g., the S&P 500 for the US, FTSE 100 for the UK, and the Shanghai Composite Index for China)

CONTEXT

You decide to build a minimum spanning tree for each of the following periods:

- **Period 1** (9-Sep-2019 to 16-Feb-2020): This represents the period before COVID had an impact on financial markets.
- **Period 2** (17-Feb-2020 to 24-Mar-2020): On 17th February, as the pandemic intensified, markets started to react to the news. A great international market crash built up and markets kept plummeting until late March.
- **Period 3** (25-Mar-2020 to 8-Sep-2020): Markets around the world started to recover and witnessed one of the fastest growing periods of the last decades.

CONTEXT

Remember to clearly state your assumptions and justify all your answers!

QUESTION 1

Explain how the minimum spanning trees are built to perform this analysis by answering the following questions:

i. What do the nodes and links represent? [2 marks]

ii. Do you think a minimum spanning tree is a good representation for this network? Are there better alternatives? If not, why? [2 marks]

QUESTION 1

What do links and nodes represent?

QUESTION 1

Is the minimum spanning tree a good representation? Why? Are there better alternatives?

QUESTION 2

You perform a basic network analysis for each period, and find the results displayed in Table 1 and Table 2. Based on these results, answer the following questions:

QUESTION 2

Quantity	Period 1	Period 2	Period 3
Diameter	10.00	13.00	12.00
Average Assortativity	-0.28	-0.24	-0.21
Average Shortest Path Length	4.62	5.88	5.08

Table 1: Evolution of basic network quantities over the three periods

Period 1	Period 2	Period 3
Degree Centrality (Top 5)		
South Korea	United Kingdom	France
France	Philippines	South Korea
Germany	Germany	United Kingdom
Hong Kong	South Korea	Canada
Netherlands	Brazil	Netherlands
Betweenness Centrality (Top 5)		
France	United Kingdom	France
South Korea	Spain	Sweden
Netherlands	Italy	Finland
Italy	Philippines	Thailand
Germany	Belgium	India

Table 2: Evolution of degree centrality and betweenness centrality over the three periods considered.

During long stock market crashes it is commonly observed that stocks become more correlated. Do you think this was also true for countries during the COVID Stock Market Crash?

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Table 2: Evolution of degree centrality and betweenness centrality over the three periods considered.

What can be inferred from the assortativity values of the minimum spanning trees during the analysed periods?

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Table 2: Evolution of degree centrality and betweenness centrality over the three periods considered.

Compare and contrast the top three countries in terms of degree centrality across the three periods. What factors may have contributed to the shifts in degree centrality rankings?

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In light of their changes in betweenness centrality, explain the changing role of France and the UK across the three periods. How might these changes in betweenness centrality impact the flow of information between international markets?

QUESTION 3

You perform community detection, and find some interesting dynamics for Japan and Australia.
In **Period 1**, Japan and Australia are the only two members of their own community.
In **Period 2**, Australia becomes part of the community formed by the United States, Mexico, and Brazil, which existed already in Period 1. Japan forms a new community with India and Singapore.
In **Period 3**, we see a new community formed by Japan, Australia, Taiwan, Indonesia, and South Korea.

Comment on the evolution of this community.