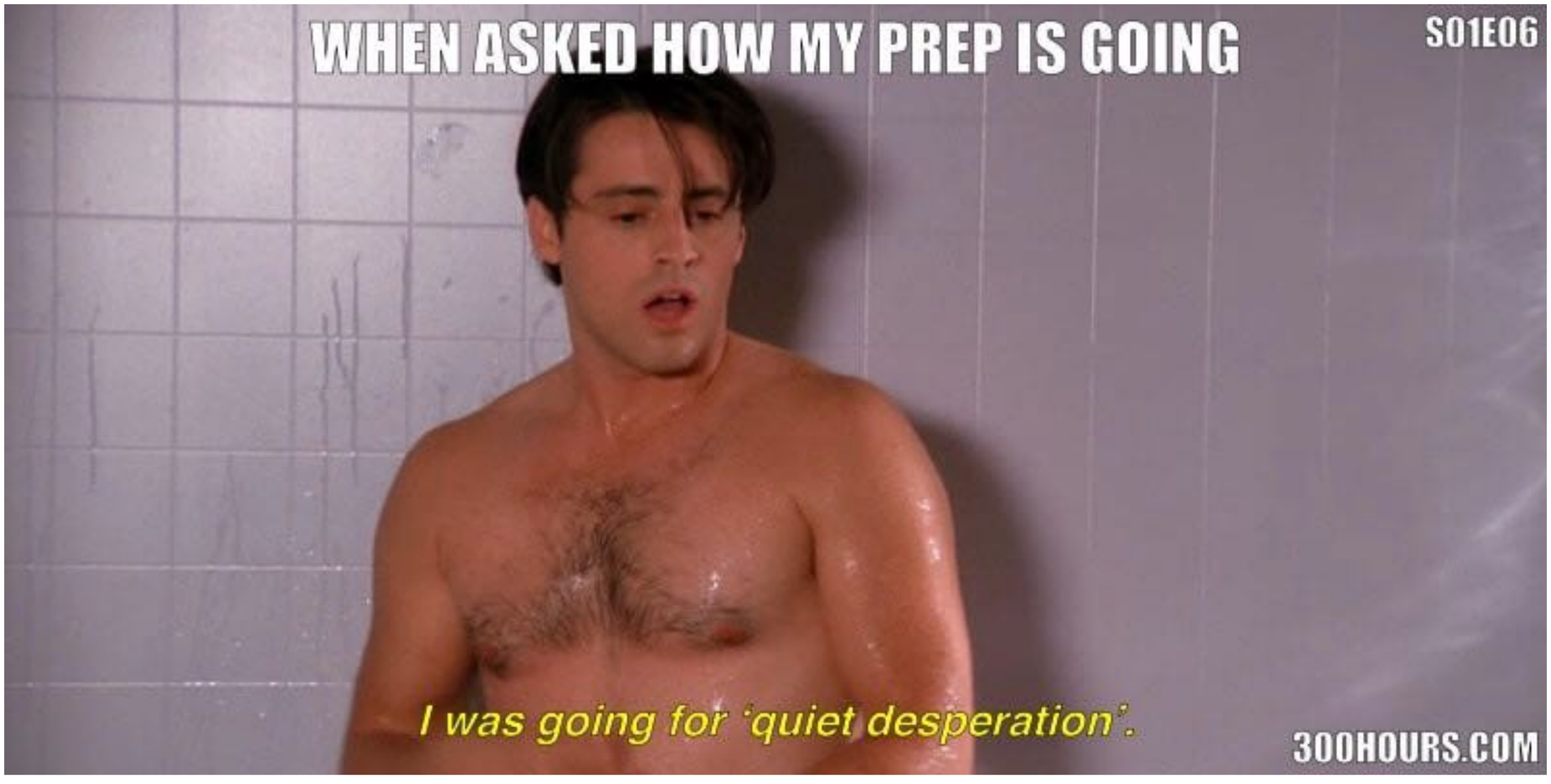
Mock exam and mid-course revision



LEARNING OUTCOMES

Revise the material of the first part of the course

Prepare for the exam

CONTEXT

Congratulations!
You have just been **hired by DBBA Bank**, a digital bank with a lot of customers throughout the UK

CONTEXT

Your first task is to **analyse a network of financial transactions** with the **goal of spotting money laundering**.

Your data contain **all transactions from all the DBBA Bank's customers**. This includes payments, transactions between customers, and money transfers between different accounts (remember that a customer may have more than one account).

QUESTION 1

Describe how you would model the data as a network. Do so by answering the following questions:

i. What type of network would this be (e.g., single-layer, multipartite, tree, etc.)?

ii. What do the nodes represent?

iii. What do the links represent?

iv. Is the network weighted or unweighted?

v. Is the network directed or undirected?

Clearly state your assumptions and justify all your answers!

QUESTION 1

What type of network would this be (e.g., single-layer, multipartite, tree, etc.)?

QUESTION 1

What do the nodes represent?

QUESTION 1

What do the links represent?

QUESTION 1

Is the network weighted or unweighted?

QUESTION 1

Is the network directed or undirected?

QUESTION 2

Given the current economic turmoil, DBBA Bank wants to explore whether they should **change their asset allocation**.

To do so, you are asked to perform **a temporal analysis of the UK's stock price correlation network.**

Since you have attended DBBA, you decide to do so by building the **maximum spanning tree of the network for each month of data in the last year.**

While doing your analysis, you notice one thing: Meme Invest, a famous **investment fund**, was the **most central node** in the tree at the beginning of the period you are analysing, forming a **super star**. However, **its degree has progressively decreased**, and now Meme Invest is **not even a hub** anymore.

QUESTION 2

Given what you know about Meme Invest and its position in the network, what could be the cause of its degree dropping?

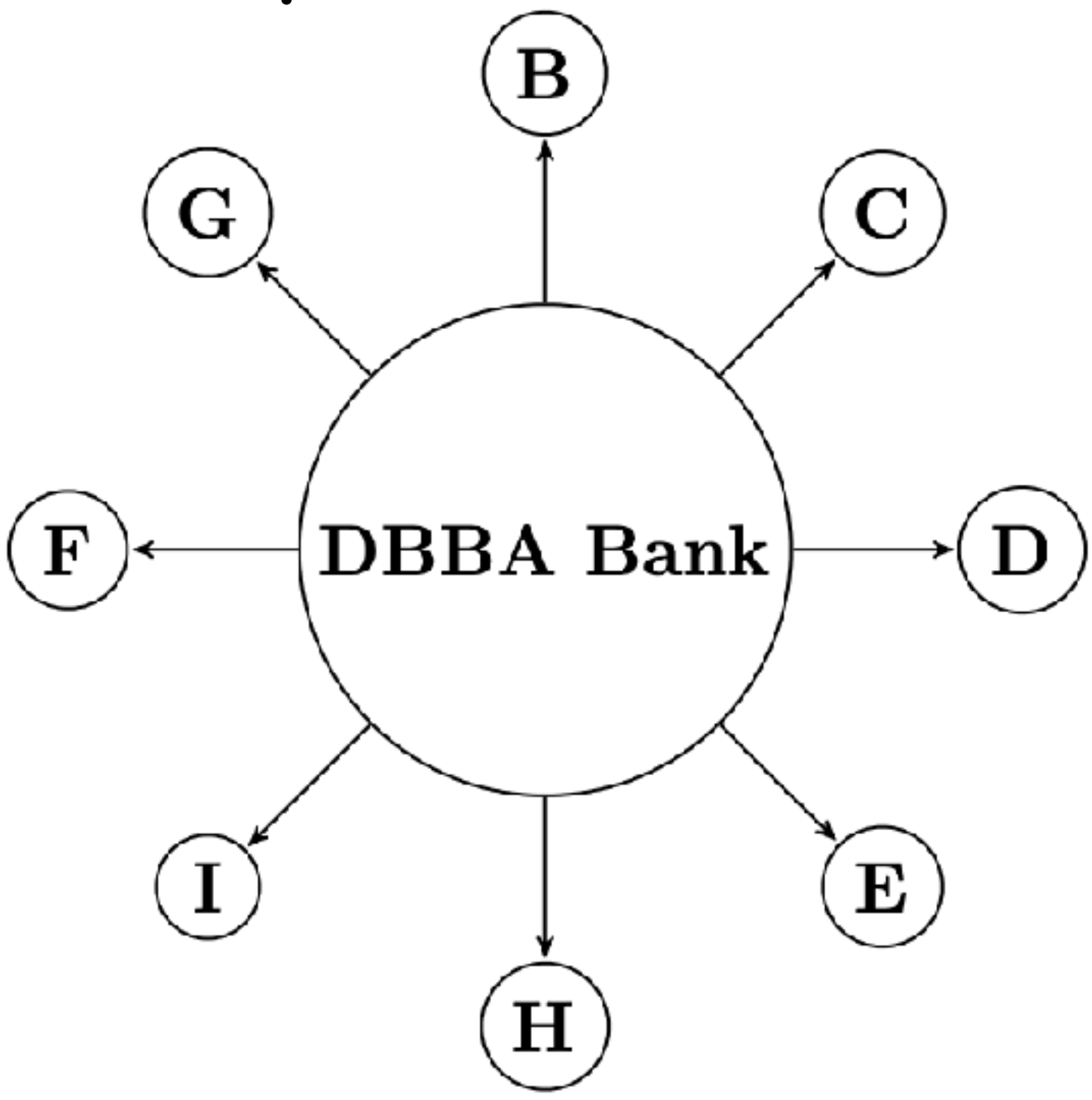
QUESTION 2

How can DBBA Bank use this result?

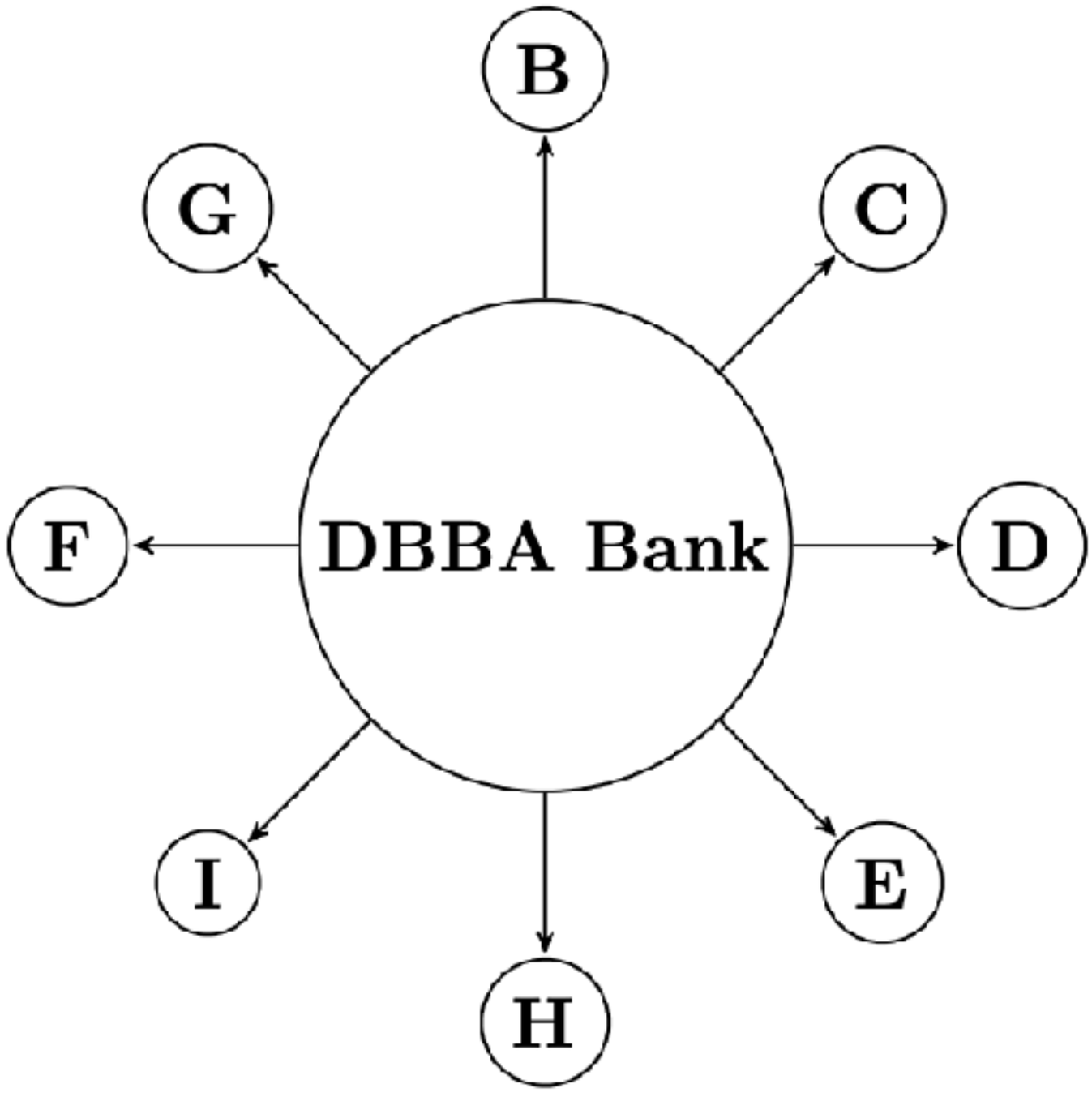
QUESTION 3

The **unweighted, directed** network below is DBBA Bank's **ego-network of interbank loan**. Each node represents a bank. A link from **i to j means that i lends money to j**. Answer the following questions:

QUESTION 4

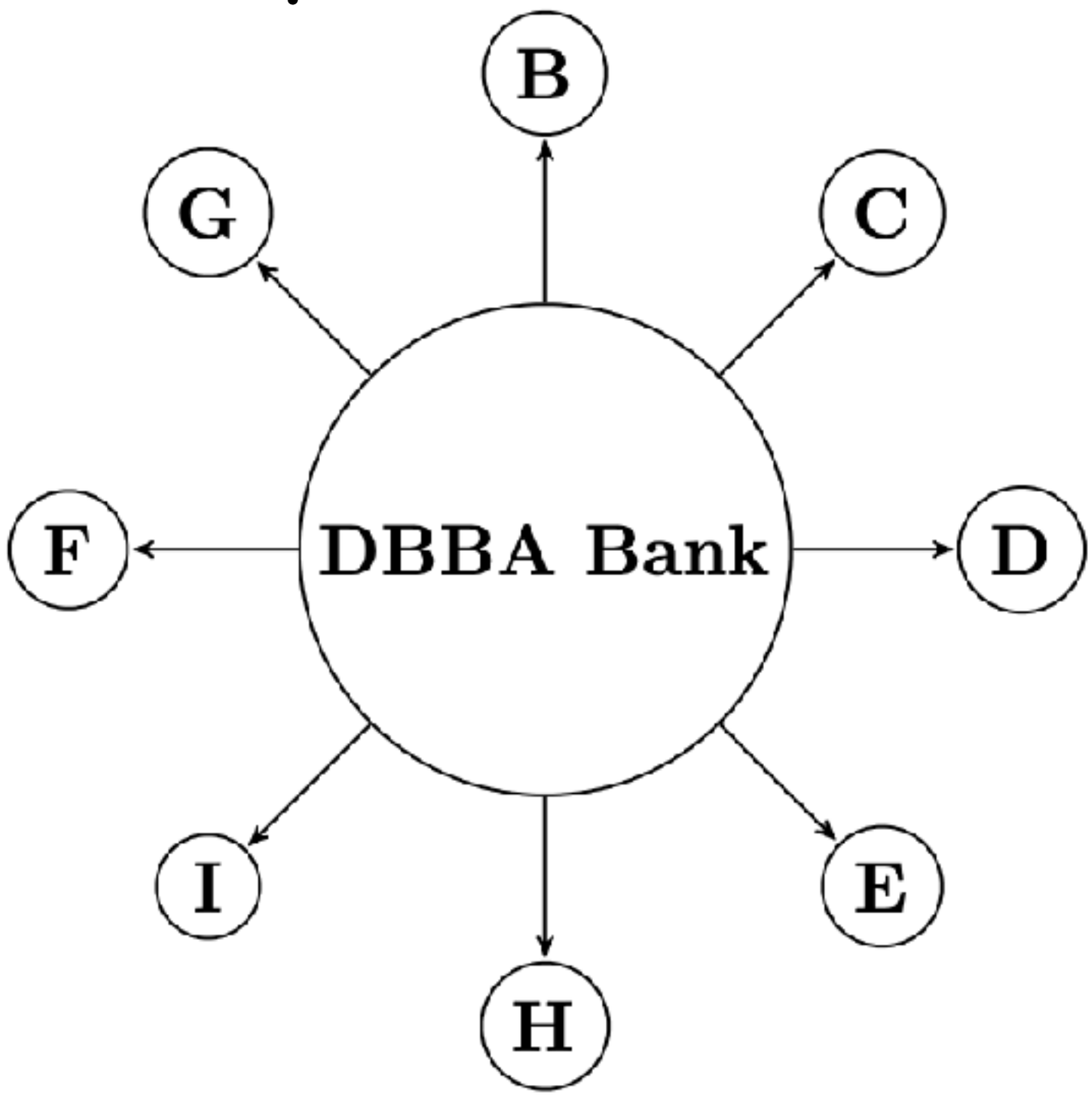


QUESTION 4



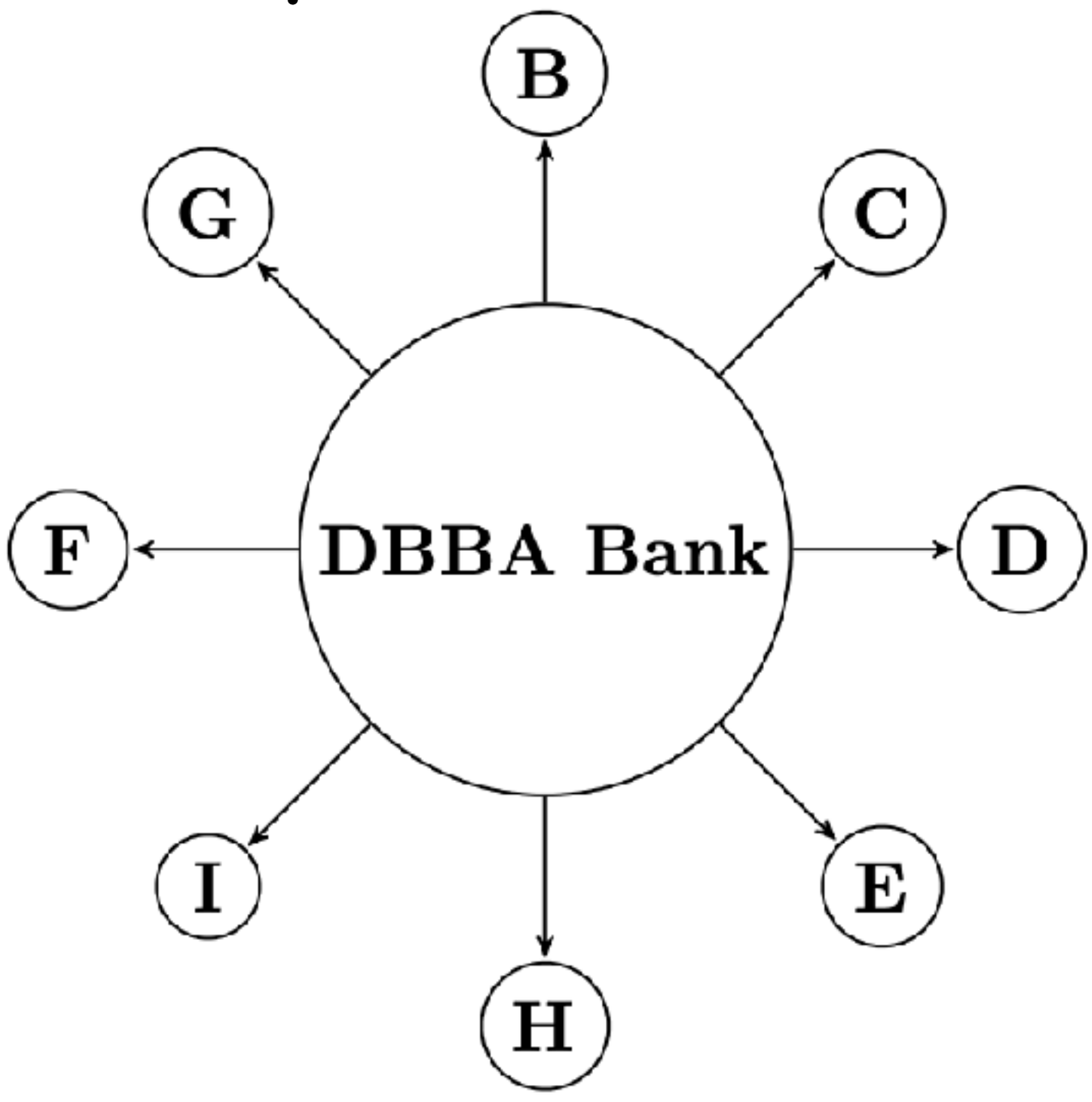
List the nodes that belong to the largest weakly connected component and the nodes that belong to the largest strongly connected component. Justify your answer.

QUESTION 4



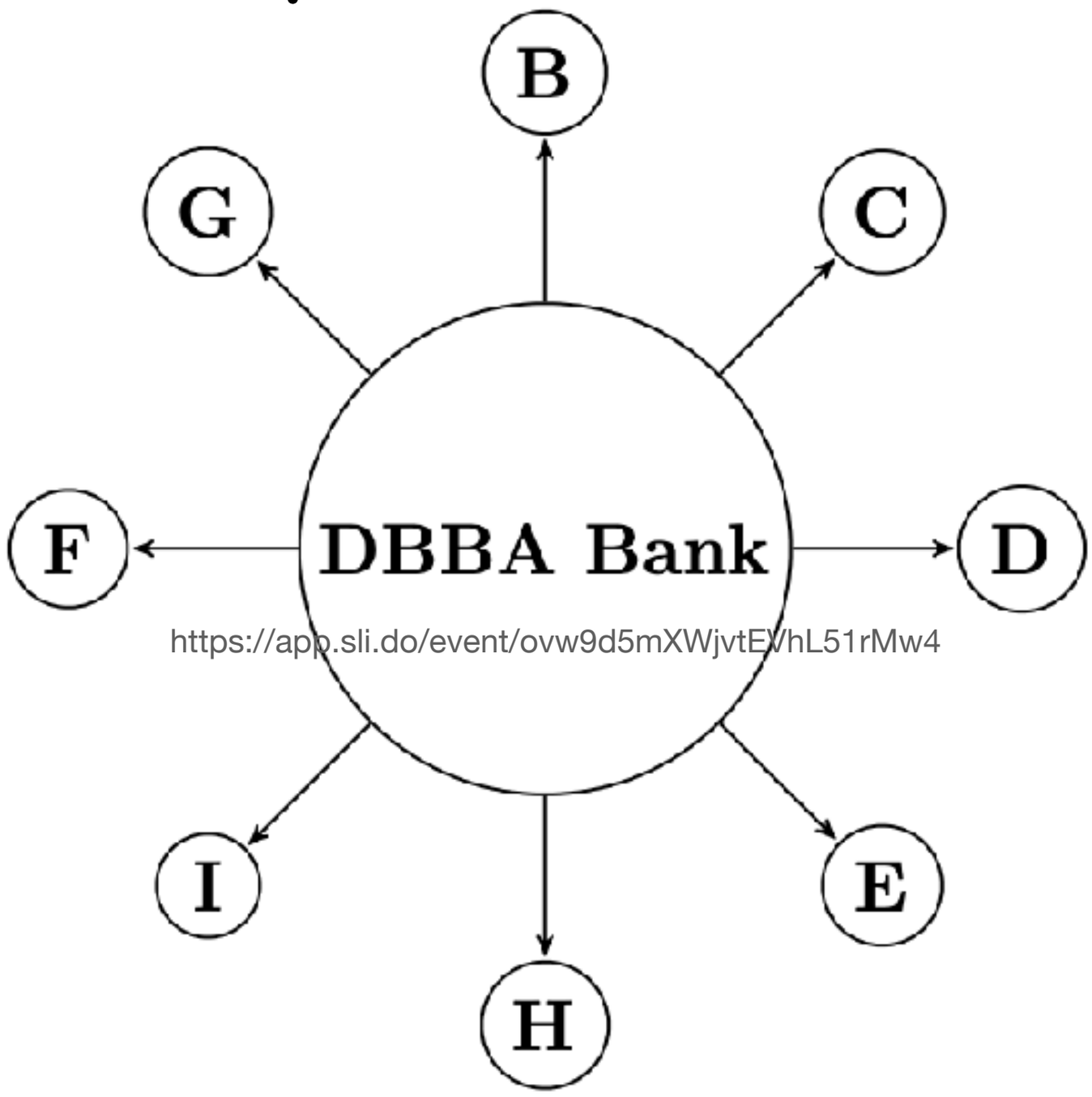
Comment on the centrality of the nodes in the network.

QUESTION 4



Discuss the robustness of the network (maximum five sentences)

QUESTION 4



https://app.sli.do/event/ovw9d5mXWjvtEVhL51rMw4

In case of a systemic shock, which bank would be the most affected? State your assumptions (if any) and justify your answer.

QUESTION 4

Click on this link
https://app.sli.do/event/ovw9d5mXWjvtEVhL51rMw4

Or go to
www.sli.do
and enter the code
3770156