**Question 1:**

Adjacency matrix:

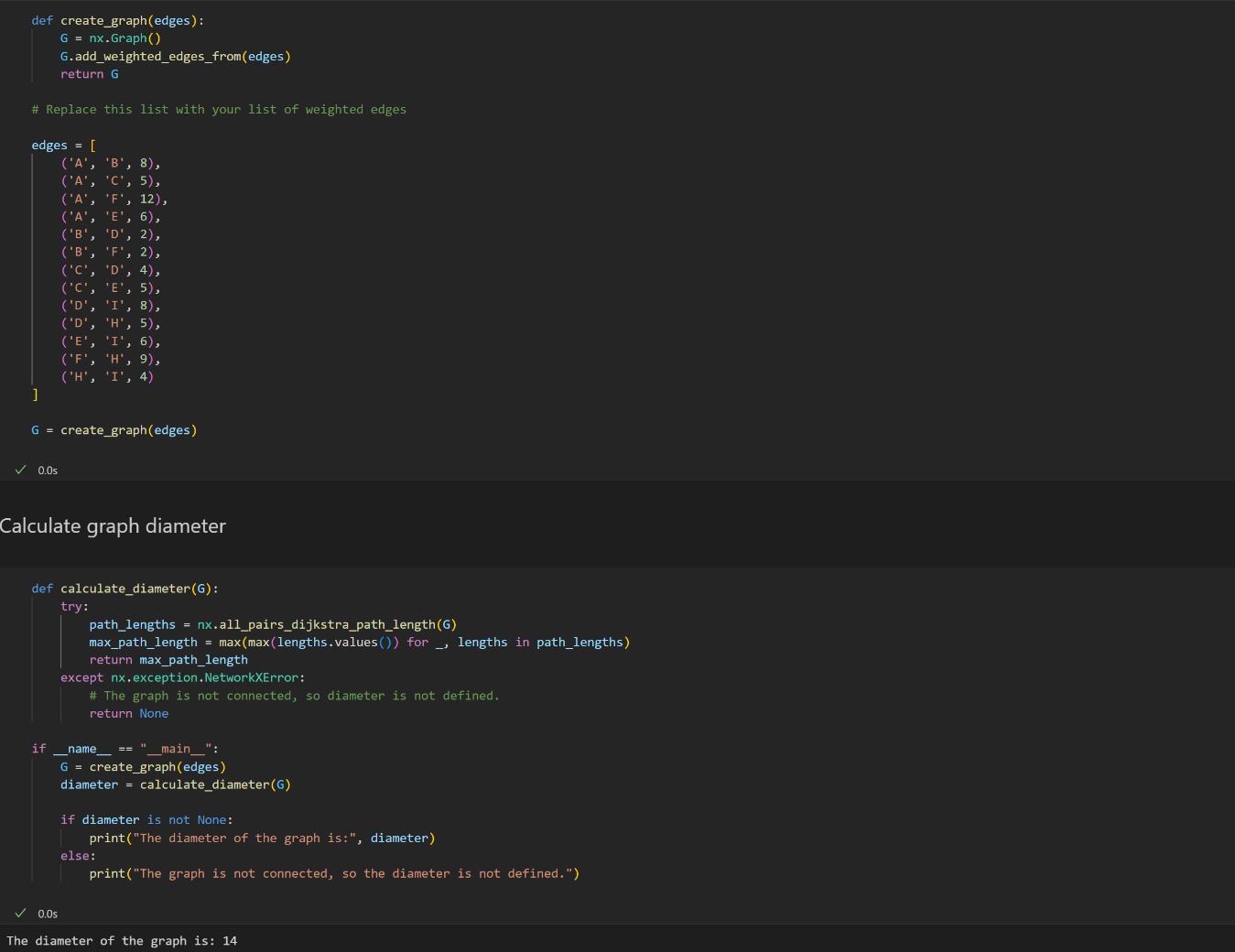
* (square) matrix where n is the number of vertices in the graph
* Undirected graphs are symmetrical along the diagonal whereas directed are not
* Edge represented by 1 at position else it is 0
* If graph is weighted position holds the weight instead of 1 or 0

Incidence matrix:

* (rectangular) matrix where n is the number of vertices in the graph and m is the number of edges in the graph
* Undirected graphs use 0 and 1 to represent which edges connect to which verity
* Directed graphs use -1 and 1 to represent the direction of an edge where -1 is the tail of the edge and 1 is the head
* Weighted incidence matrices are represented by replacing -1 and 1 by their respective weights for directed graphs; replace 1 if undirected

**Question 2:**

The diameter of the graph is 14 To get 14, I used this python code; the .py file is also attached in the homework submission:



**Question 3:**

*Retrieve the names of the customers who have purchased chocolate:*

match (u:User)-[:COMPLETED]->(o:Order)<-[:CONTAINS]-(i:Item)

where i.item\_name = "chocolate"

return u.name

*Retrieve the email addresses and the credit card numbers of customers who have purchased beer:*

match (e:Email)-[:SignedUpWith]->(u:User)-[:Registered]->(c:CreditCard)-[:PaidUsing]->(o:Order)<-[:Contains]-(i:Item)

where i.item\_name = "beer"

return e.e-address, c.cc\_number