Introduction

Social Networks - July 2020

MCQ Assignment - Week 1

1. If `string = 'PRERAJULISATION'`, what will be the output of `string[3:7]` (written in Python3)?

   A. `'ERAJ'`
   B. `'RAJU '`
   C. `'LISA'`
   D. `TypeError`

   ANSWER: B
   A string acts as a list. Here, the index goes from 3 to 6.

2. Let `L = ["There", "are", ["eight", "elements", "in", "this"], [["list"]], []]` be the list. What will be the output of `len(L)`, written in Python3?

   A. 5
   B. 6
   C. 7
   D. 8

   ANSWER: A
   There are only 6 objects in the list.

3. What is the output of `L[-2]` if `L = [-4, -3, -2, -1, 0, 1, 2, 3, 4]`?

   A. 0
   B. 1
   C. 2
   D. 3

   ANSWER: D
   Negative index means, count from the right. The last element's index is -1. Keep reducing the index while going from right to left.

4. Total number of graphs (undirected and without loops) possible on n vertices is:

   A. n^2
   B. $\binom{n}{2}$
   C. 2^{n^2}
   D. $2^{\binom{n}{2}}$

   ANSWER: D
   In any graph with n vertices, the maximum possible number of edges is $\binom{n}{2}$. There are two possibilities

for each edge-either to be or not to be in the graph. So, for n edges each of these $2^{\binom{n}{2}}$ possibilities corresponds to different graphs. Hence the answer.

5. If `d = {0:'a', 1:'b', 2:'c', 3:'d'}` is the dictionary then which among the following codes (written in Python3) would reverse `keys` and `values` of `d`?

   A. `{v:k for k,v in d.items()}`
   B. `{d[i]:i for i in range(4)}`
   C. `{d[i]:i for i in d}`
   D. All of the above

   ANSWER: D
   All of the above codes reverses `d` to `{'a':0, 'b':1, 'c':2, 'd':3}`

6. Total number of possible edges on a graph (undirected and without loops) on n vertices is **not**:

   A. $\frac{n(n-1)}{2}$
   B. $\binom{n}{2}$
   C. $1+2+3+\cdots+(n-1)+n$
   D. $1+2+3+\cdots+n-1$

   ANSWER: C
   In any graph with n vertices, the maximum possible number of edges is $\binom{n}{2}$. Option A and D are other forms of it.

7. Let `t` be a tuple `("Happy", "Learning", "from")`. What will be the output of `t.append(("IIT Ropar"))`, written in Python3?

   A. `("Happy", "Learning", "from", "IIT Ropar")`
   B. `("Happy", "Learning", "from", ("IIT Ropar"))`
   C. `("Happy", "Learning", ("from", "IIT Ropar"))`
   D. `Attribute Error`

   ANSWER: D
   Python tuple is an immutable object. Hence any operation that tries to modify it (like append) is not allowed.

8. For integers $n > 1$, let G_n be a complete graph on n vertices such that each vertex is labeled by a distinct number $1, 2, 3, \cdots, n$, and each edge is labeled by the sum of its endpoint labels. The sum of all the edge labels is:

   A. $\frac{n(n-1)^2}{2}$
   B. $\frac{n(n-1)(n+1}{2}$
   C. $n(n-1)(n+1)$
   D. $\frac{n(n+1)}{2}$

ANSWER: B
$(1+2)+(1+3)+(1+4)+\cdots+(1+n)$
$(2+3)+(2+4)+\cdots+(2+n)$
$\vdots$
Each number is used $(n-1)$ times in the sum. Hence, $\sum_{i=1}^{n}(n-1)i = \frac{n(n-1)(n+1)}{2}$.

9. **True or False:**
There exists a graph with 5 vertices where each vertex has degree 3.

A. True
B. False

ANSWER: B
This is not possible by the handshaking theorem, because the sum of the degrees of the vertices $3 \times 5 = 15$ is odd.

10. Let G be a graph with n vertices. We label these vertices as $0, 1, 2, \cdots, (n-1)$. There is an edge between a vertex i and a vertex j if $\mod i - j = 1$. How many edges are there in the graph G?

A. 1
B. $n-1$
C. n
D. $n+1$

ANSWER: C
We get C_n which has n edges.