Week 1: Assignment 1

1) What is the number of edges present in a complete graph having 'n' vertices?   *1 point*

- ○ (n*(n+1))/2
- ◉ (n*(n-1))/2
- ○ n
- ○ Information given is insufficient

2) Which of the following functions is used to remove all edges and nodes in a graph in NetworkX?   *1 point*

- ○ networkx.MultiDiGraph.clear(u, v[, (key)]
- ○ networkx.MultiDiGraph.remove_edge(u, v[, (key)]
- ◉ networkx.MultiDiGraph.clear()
- ○ networkx.MultiDiGraph.remove()

3) What will be the output of the following Python code?   *1 point*
```
t = (1, 2, 4, 3, 8, 9)
[t[i] for i in range(0, len(t), 2)]
```

- ○ [2, 3, 9]
- ○ [1, 2, 4, 3, 8, 9]
- ◉ [1, 4, 8]
- ○ (1, 4, 8)

4) In which line there(s) is an error?   *1 point*
```
G = nx.Graph()  // line 1
```
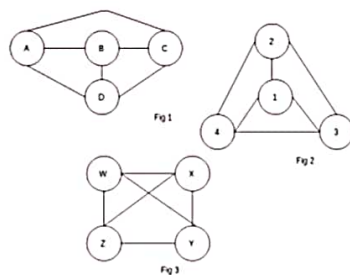
⌣ (1, 4, 8)

4) In which line there(s) is an error?   *1 point*

```
G = nx.Graph()  // line 1
G.add_node(1) // line 2
G.add_node("Hello") // line 3
G.add_node(2.0) // line 4
```

○ line 4
○ line 2
○ line 3
◉ None of these

5) Which of the following graphs are isomorphic to each other?   *1 point*

○ Fig 1 and Fig 2
○ Fig 2 and Fig 3
○ Fig 1 and Fig 3
◉ Fig 1, Fig 2 and Fig 3

○ Fig 2 and Fig 3
○ Fig 1 and Fig 3
● Fig 1, Fig 2 and Fig 3

6) What is the value of the sum of minimum in-degree and maximum out-degree of a Directed Acyclic Graph? *1 point*

○ Depends on a Graph
○ Will always be zero
○ Will always be greater than zero
● May be zero or greater than zero

7) Assuming the value of every weight to be greater than 10, in which of the following cases the shortest path of a directed weighted graph from 2 vertices 'u' and 'v' will never change? *1 point*
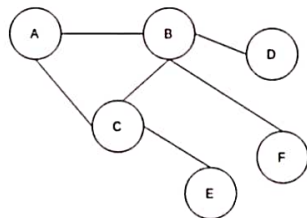
○ add all values by 10
○ subtract 10 from all the values
● multiply all values by 10
○ in both the cases of multiplying and adding by 10

8) In the given graph which edge should be removed to make it a Bipartite Graph? *1 point*
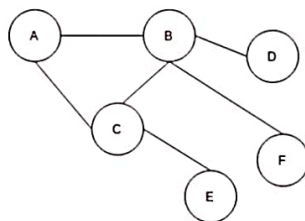
● A-C
○ B-F

- ⦿ A-C
- ◯ B-E
- ◯ C-D
- ◯ D-E

9) What will be the output of the following Python code?   *1 point*

```
1.      str1 = 'hello'
2.      str2 = ','
3.      str3 = 'world'
4.      str1[-1:]
```

- ◯ olleh
- ◯ hello
- ◯ h
- ⦿ o

10) For any two different vertices u and v of an Acyclic Directed Graph if v is reachable from u, which of the following is true?   *1 point*

- ◯
  u is also reachable from v
- ⦿
  u is not reachable from v

- ◉ A-C
- ○ B-E
- ○ C-D
- ○ D-E

9) What will be the output of the following Python code?   *1 point*

```
1.    str1 = 'hello'
2.    str2 = ','
3.    str3 = 'world'
4.    str1[-1:]
```

- ○ olleh
- ○ hello
- ○ h
- ◉ o

10) For any two different vertices u and v of an Acyclic Directed Graph if v is reachable from u, which of the following is true?   *1 point*

- ○
- u is also reachable from v
- ◉
- u is not reachable from v
- ○ insufficient information

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers

Loading [MathJax]/jax/output/HTML-CSS/jax.js

Week 2: Assignment 2

Your last recorded submission was on 2021-08-13, 10:57 IST   Due date: 2021-08-18, 23:59 IST.

1) Road network is a _____ network whereas email network is a _____ network.   *1 point*

 - ● Undirected, Directed
 - ○ Undirected, Undirected
 - ○ Directed, Directed
 - ○ Directed, Undirected

2) Which of the following is the most commonly used format for datasets?   *1 point*

 - ● CSV
 - ○ GML
 - ○ GraphML
 - ○ GEFX

3) Which of the following file formats can be read using read_pajek() function?   *1 point*

 - ○ .net
 - ○ .pajek
 - ○ .graphml
 - ● Both .net and .pajek

4) Which of the following function is used to calculate the average of the clustering coefficients?   *1 point*

 - ○ nx.avg_cluster(G)
 - ○ nx.average_cluster(G)

4) Which of the following function is used to calculate the average of the clustering coefficients?   *1 point*

○ nx.avg_cluster(G)
○ nx.average_cluster(G)
○ nx.avg_clustering(G)
◉ nx.average_clustering(G)

5) Gephi is written in which of the following languages?   *1 point*

○ Python
○ R
◉ Java
○ C

6) If a simple graph G, contains n vertices and m edges, the number of edges in the Graph G'(Complement of G) is _____?   *1 point*

○
($n*n$-n-$2*m$)/2
○
($n*n$+n+$2*m$)/2
◉
($n*n$-n-$2*m$)/2
○
($n*n$-n+$2*m$)/2

7) State True or False: *1 point*
All trees with n vertices consists of n-1 edges.

◉ True
○ False

8) If n is the number of nodes, what is the minimum number of edges needed to make graph connected?   *1 point*

○
C_2^n
◉

$(n*n-n+2*m)/2$

7) State True or False: *1 point*
All trees with n vertices consists of n-1 edges.

⦿ True
◯ False

8) If n is the number of nodes, what is the minimum number of edges needed to make graph connected?   *1 point*

◯
C_2^n
⦿
n-1
◯
$n/2$
◯
$3n/4$

9) What will be the diameter of a complete graph of 15 nodes?   *1 point*

⦿ 1
◯ 10
◯ 15
◯ 12

10) For a undirected network G made of 3 nodes and 2 edges, what will be the density ρ(G)?   *1 point*

⦿ 0.66
◯ 0.33
◯ 0.49
◯ 0.56

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers

Week 3: Assignment 3

The due date for submitting this assignment has passed.

Assignment submitted on 2021-08-25, 18:34 IST

1) Which of the following is/are true in case of providing any opportunity? *1 point*

- ☐ Strong ties are strong
- ☑ Strong ties are weak
- ☑ Weak ties are strong
- ☐ Weak ties are weak

Yes, the answer is correct
Score: 1
Accepted Answers
Strong ties are weak
Weak ties are strong

2) Which of the following is correctly defined by the following statement? *1 point*
"If two people in a social network have a friend in common, then there is an increased likelihood that they will become friends themselves at some point in the future"

- ☐ Structural holes
- ⦿ Triadic closure
- ☐ Social capital
- ☐ None of these

Yes, the answer is correct
Score: 1

○ Social capital

○ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
Triadic closure

3) Which of the following is/are true related to local bridge?   *1 point*

☐ It does not belong to any triangle

☑ It cannot be a strong tie

☐ It can be a strong tie

☑ It is a weak tie

Partially Correct.
Score: 0.67

Accepted Answers:
It does not belong to any triangle
It cannot be a strong tie
It is a weak tie

4) Which of the following indicate the absence of a structural hole?   *1 point*

○ A strong relationship

○ Structurally equivalent contact

◉ Both of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
Both of these

5) Which of the following statement is correct regarding LinkedIn?   *1 point*

○ Acts as a Structural hole

○ The link between LinkedIn and the user has Low embeddedness

◉ The link between LinkedIn and the user has High embeddedness

○ A strong relationship

○ Structurally equivalent contact

◉ Both of these

Yes, the answer is correct.
Score: 1

Accepted Answers:
Both of these

5) Which of the following statement is correct regarding LinkedIn?   *1 point*

○ Acts as a Structural hole

○ The link between LinkedIn and the user has Low embeddedness

◉ The link between LinkedIn and the user has High embeddedness

○ Both Acts as a Structural hole and the link between LinkedIn and the user has Low embeddedness

Yes, the answer is correct.
Score: 1

Accepted Answers:
The link between LinkedIn and the user has High embeddedness

6) Which of the following input file formats does graphi allow?   *1 point*

○ Graph

◉ CSV

○ Database

○ .xlx

○ All of these

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of these

7) Out of the following matrices, which of these can be used to depict a graph?   *1 point*

○ Adjacency Matrix

○ Degree Matrix

All of these

7) Out of the following matrices, which of these can be used to depict a graph?   *1 point*

○ Adjacency Matrix
○ Degree Matrix
○ Laplace matrix
○ Both Adjacency and Degree Matrix
○ Both Degree Matrix and Laplace matrix
◉ Adjacency Matrix, Degree Matrix and Laplace matrix

Yes, the answer is correct.
Score: 1
Accepted Answers:
Adjacency Matrix, Degree Matrix and Laplace matrix

8) Which of the following indicate the absence of a structural hole?   *1 point*

○ A strong relationship
○ Structurally equivalent contact
◉ Both of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
Both of these

9) What is the clustering coefficient for node 2?   *1 point*

8) Which of the following indicate the absence of a structural hole?   *1 point*

○ A strong relationship
○ Structurally equivalent contact
◉ Both of these

9) What is the clustering coefficient for node 2?   *1 point*

Figure 1

◉ 1
○ 0.33
○ 0
○ None
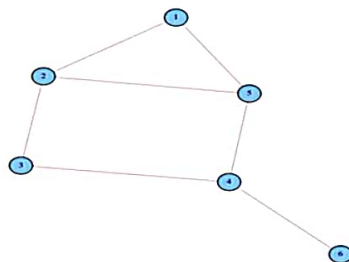
Figure 1

- ⦿ 1
- ○ 0.33
- ○ 0
- ○ None

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.33

10) Given 6 employees in a company, what are the number of ways that they will know each other?   *1 point*

- ○ 15
- ○ 13
- ○ 10
- ⦿ 6

No, the answer is incorrect.
Score: 0
Accepted Answers:
15

Course outline

How does an NPTEL online
course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Lecture 41 - Introduction to
Homophily - Should you
watch your company ?

Lecture 42 - Selection and
Social Influence

Lecture 43 - Interplay
between Selection and Social
Influence

Lecture 44 - Homophily -
Definition and measurement

Lecture 45 - Foci Closure and
Membership Closure

Lecture 46 - Introduction to

Week 4: Assignment 4

The due date for submitting this assignment has passed.

Due on 2021-09-01, 23:59 IST.

Assignment submitted on 2021-09-01, 17:52 IST

1) Among which of the following, the individual characteristics drive the formation of links?   *1 point*

- Selection
- Social influence
- None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
Selection

2) Consider the following two statements: *1 point*
   S1: *the neighbourhood overlap of two editors in the bipartite affiliation network of editors and articles, consisting only of edges from editors to the articles they've edited.*
   S2: *measure of similarity of editors.*

   Are the two statements equivalent?

- S1 is equivalent to S2
- S1 is different from S2

Yes, the answer is correct.
Score: 1
Accepted Answers:
S1 is equivalent to S2

3) If $A = \{5, 6, 7\}$ and $B = \{6, 7, 10, 12\}$; then calculate the similarity measure between A and B.   *1 point*

○ 0.166
○ 0.33
◉ 0.4
○ 0.5

Yes, the answer is correct.
Score: 1
Accepted Answers:
0.4

4) Which of the following statements are/ is true?   *1 point*

☑ Homophily exists between people of similar ideas.
☐ Homophily exists between people of varying ideas.
☐ Heterophily exists between people of similar ideas.
☑ Heterophily exists between people of varying ideas.

Yes, the answer is correct.
Score: 1
Accepted Answers:
Homophily exists between people of similar ideas.
Heterophily exists between people of varying ideas.

5) With regards to fatman evolutionary model, which of the following is correct?   *1 point*

○ Foci nodes are nodes among the participant nodes.
◉ Foci nodes are nodes added apart from the participant nodes.
○ Foci nodes are not a part of the model.
○ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
Foci nodes are nodes added apart from the participant nodes.

Heterophily exists between people of varying ideas.

5) With regards to fatman evolutionary model, which of the following is correct?   *1 point*

○ Foci nodes are nodes among the participant nodes.

◉ Foci nodes are nodes added apart from the participant nodes.

○ Foci nodes are not a part of the model.

○ None of these

Yes, the answer is correct.
Score: 1

Accepted Answers:
Foci nodes are nodes added apart from the participant nodes.

6) If get_person_nodes(G) assigns nodes to each person in a graph, what does the following code implement?   *1 point*

```
pnodes = get_person_nodes(G)
for u in pnodes:
    for v in pnodes:
        if (u != v):
            diff = abs(G.nodes[u]['name'] - G.nodes[v]['name'])
            p = 1 / (diff + 1000)
            r = random.uniform(0, 1)
            if (r < p):
                G.add_edge(u, v)
```

◉ Homophily

○ Closure

○ Social influence

○ Cannot predict as information incomplete

Yes, the answer is correct.
Score: 1

Accepted Answers:
Homophily

7) Which of the following links are not possible in context to closure?   *1 point*

○ People-people

7) Which of the following links are not possible in context to closure? **1 point**

- ○ People-people
- ○ People-foci
- ◉ Foci-foci
- ○ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
Foci-foci

8) When plotted on a graph, the similarity measure curve is _____ after the time at which two people started a conversation than the time **1 point**
after which they started conversing.

- ◉ Steeper
- ○ Slighter
- ○ Flatter
- ○ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
Steeper

9) Which of the following statement is true? **1 point**
   S1: *if two people participate in a shared focus, this provides them with an opportunity to become friends;*
   S2: *if two people are friends, they can influence each other's choice of foci.*

- ○ S1 is true and S2 is false
- ○ S1 is false and S2 is true
- ◉ S1 and S2 are true
- ○ S1 and S2 are false

Yes, the answer is correct.
Score: 1
Accepted Answers:

○ S1 is false and S2 is true
◉ S1 and S2 are true
○ S1 and S2 are false

Yes, the answer is correct.
Score: 1
Accepted Answers:
S1 and S2 are true

10) Considering circles as people and triangles as the corporate boards to which people belong to, what does the figure 1 denote?   *1 point*
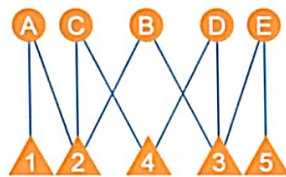
Figure 1

◉ Bipartite Graph
○ Affiliation Graph
○ Both Affiliation and Bipartite graph
○ None of these

No, the answer is incorrect.
Score: 0
Accepted Answers:
Both Affiliation and Bipartite graph

Week 6: Assignment 6

The due date for submitting this assignment has passed.

Due on 2021-09-08, 23:59 IST.

Assignment submitted on 2021-09-08, 19:30 IST

1) Which of the following is a link analysis task?   *1 point*

- ○ Link-based Object Classification (LOC)
- ○ Link-based Object Ranking (LOR)
- ○ Link prediction
- ● All of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
All of these

2) Which of the following statement is true regarding web graph?   *1 point*

- ● It is a directed graph
- ○ It is an undirected graph
- ○ It is weighted graph
- ○ It is a signed graph

Yes, the answer is correct.
Score: 1
Accepted Answers:
It is a directed graph

It is a directed graph

3) On which scale, Page rank is calculated? *1 point*

- ○ Logarithmic scale
- ○ Exponential scale
- ○ None of these
- ○ Depends on network to network

Yes, the answer is correct.
Score: 1
Accepted Answers:
Logarithmic scale

4) What is (are) the problem(s) associated with a random surfer while calculating page rank? *1 point*

- ☑ A random surfer is caught when he encounters a dangling node such as an image, pdf, data tables etc.
- ☑ A random surfer completely abandons the hyperlink method and moves to a new browser and enter the URL in the URL line of the browser.
- ☐ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
A random surfer is caught when he encounters a dangling node such as an image, pdf, data tables etc.
A random surfer completely abandons the hyperlink method and moves to a new browser and enter the URL in the URL line of the browser.

5) What will the following line of code return? *1 point*

>> nx.pagerank(g)

- ○ Tuple
- ○ dictionary of tuples
- ○ Dictionary
- ○ List

No, the answer is incorrect.
Score: 0
Accepted Answers:
dictionary of tuples

○ Dictionary
○ List

No, the answer is incorrect.
Score: 0
Accepted Answers:
dictionary of tuples

6) Which of the following is true regarding page rank?   *1 point*

○ The more in-links that a page i receives, the more prestige the page i has.
○ The less in-links that a page i receives, the more prestige the page i has.
○ The more in-links that a page i receives, the less prestige the page i has.
○ None of these.

Yes, the answer is correct.
Score: 1
Accepted Answers:
The more in-links that a page i receives, the more prestige the page i has.

7) Let algorithm 1 denotes the equal coin distribution (A1) and algorithm 2 denotes the random coin dropping (A2), which of the following is true?   *1 point*

○ The nth best node according to A1 is the same as nth best node according to A2 if n is a small number.
○ The nth best node according to A1 is the same as nth best node according to A2 if n is a large number.
○ The nth best node according to A1 is the same as nth best node according to A2 irrespective of n's value.
○ The nth best node according to A1 is never the same as nth best node according to A2.

Yes, the answer is correct.
Score: 1
Accepted Answers:
The nth best node according to A1 is the same as nth best node according to A2 irrespective of n's value.

8) What is the function of the following line of code?   *1 point*

g = add_edges(g, 0.4)

○ Add undirected edges in graph
○ Add directed edges in graph

8) What is the function of the following line of code?   *1 point*

g = add_edges(g, 0.4)

○ Add undirected edges in graph
◉ Add directed edges in graph
○ Incomplete information

No, the answer is incorrect.
Score: 0

9) How much time does naïve computation of random walk measure usually requires?   *1 point*

○ $O(n^2)$
○ $O(n)$
◉ $O(n^3)$
○ None of these

Yes, the answer is correct.
Score: 1

10) Given a graph g and points on random walk, what does the function X depict?   *1 point*
```
def X(g, points):
    t = np.array(points)
    t = np.argsort(-t)
    return t
```

○ rank of nodes according to their edge weight
◉ rank of nodes according to their random walk points
○ rank of nodes according to the number of times they have been visited
○ None of these

9) How much time does naive computation of random walk measure usually requires?   *1 point*

- ○ $O(n^2)$
- ○ $O(n)$
- ◉ $O(n^3)$
- ○ None of these

10) Given a graph g and points on random walk, what does the function X depict?   *1 point*

```
def X(g, points):
    t = np.array(points)
    t = np.argsort(-t)
    return t
```

- ○ rank of nodes according to their edge weight
- ◉ rank of nodes according to their random walk points
- ○ rank of nodes according to the number of times they have been visited
- ○ None of these

Week 7: Assignment 7

The due date for submitting this assignment has passed.

Assignment submitted on 2021-09-15, 18:14 IST

1) What will be the incentive given to nodes if they chose different behaviours?   *1 point*

- ○ q
- ○ 1-q
- ◉ 0
- ○ 1

Yes, the answer is correct
Score 1
Accepted Answers
0

2) State true or false   *1 point*
"Homophily can never serve as a barrier to diffusion"

- ○ True
- ◉ False

Yes, the answer is correct
Score 1
Accepted Answers
False

3) What are the factors which influence model diffusion?   *1 point*

...............can never serve as a barrier to diffusion

○ True
◉ False

Yes, the answer is correct.
Score: 1
Accepted Answers:
False

3) What are the factors which influence model diffusion?   *1 point*

○ Payoff
○ Communities
○ Key people
○ Cascade formation
◉ All the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
All the above

4) Why do people generally follow a company's page?   *1 point*

○ learn about new products and services
○ to stay up to date on company news
○ connect with people similar to themselves
○ to connect with people who are different to them
◉ All the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
All the above

5) If d is the number of neighbours and p is fraction of neighbours which adopt node A, when can it be said that A is the better choice?   *1 point*

◉ $pda \geq (1 - p)db$
○ ....

○ All the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
All the above

5) If d is the number of neighbours and p is fraction of neighbours which adopt node A, when can it be said that A is the better choice? *1 point*

○ pda ≥ (1 − p)db
○ pda ≤ (1 − p)db
○ pda = (1 − p)db
○ pda ≤ pdb

Yes, the answer is correct.
Score: 1
Accepted Answers:
pda ≥ (1 − p)db

6) Under what condition, do we say that set of initial adopters cause a complete cascade at threshold q? *1 point*

○ If the resulting cascade of adoptions of A eventually causes every node to switch from B to A
○ If the resulting cascade of adoptions of A eventually causes only some nodes to switch from B to A
○ If the resulting cascade of adoptions of A eventually causes no node to switch from B to A
○ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
If the resulting cascade of adoptions of A eventually causes every node to switch from B to A

7) Which of the following is an example of social reinforcement? *1 point*

○ A child hesitantly raises his hand in class to answer a question. The teacher praises for his efforts or a peer winks from across the room.
○ A child finishes all of his chores. The parent gives access to a computer game for 20 minutes.
○ All of these
○ None of these

Yes, the answer is correct.

A child hesitantly raises his hand in class to answer a question. The teacher praises for his efforts or a peer winks from across the room.

8) State true or false: **1 point**
"An effective viral marketing campaign requires that marketers identify individuals with high social networking potential."

- ◉ True
- ○ False

Yes, the answer is correct.
Score: 1
Accepted Answers:
True

9) Suppose every player in a game is given a payoff a and b based on two actions, A and B. Now, there are two friends Monika and Phoebe; Monika **1 point** decides to adopt action A while Phoebe decides to adopt action B. What are the payoffs that they get?

- ○ Monika- a, Phoebe - b
- ○ Monika- a, Phoebe - 0
- ○ Monika- 0, Phoebe - b
- ◉ Monika- 0, Phoebe - 0

Yes, the answer is correct.
Score: 1
Accepted Answers:
Monika- 0, Phoebe - 0

10) Consider two actions X and Y. The payoff associated with the action X is 40 while the payoff associated with action Y is 10. In such a case, what **1 point** is the threshold fraction of neighbours that should have adopted X, in order for a node to adopt the action X?

- ○ 1/2
- ○ 1/4
- ◉ 1/5
- ○ 1/3

Yes, the answer is correct.
Score: 1
Accepted Answers:
1/5

Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Lecture 101 : Introduction to Hubs and Authorities (A Story)

Lecture 102 : Principle of Repeated Improvement (A story)

Lecture 103 : Principle of

Week 8: Assignment 8

The due date for submitting this assignment has passed.

Assignment submitted on 2021-09-22, 18:02 IST

1) Which of the following statements is/are true?   *1 point*

- ☑ If v links to pages with high authority scores, its hub score increases
- ☑ If page v is linked to good hubs, its authority score increases
- ☐ If page v is linked to good hubs, its authority score decreases
- ☐ If v links to pages with high authority scores, its hub score decreases

Yes, the answer is correct.
Score: 1
Accepted Answers:
If v links to pages with high authority scores, its hub score increases
If page v is linked to good hubs, its authority score increases

2) State true or false   *1 point*
"Hub and Authority are Exclusionary"

- ○ True
- ⦿ False

Yes, the answer is correct.
Score: 1
Accepted Answers:
False

Assignment submitted on 2021-09-22, 18:02 IST

1) Which of the following statements is/are true? *1 point*

- ☑ If v links to pages with high authority scores, its hub score increases.
- ☑ If page v is linked to good hubs, its authority score increases.
- ☐ If page v is linked to good hubs, its authority score decreases.
- ☐ If v links to pages with high authority scores, its hub score decreases.

Yes, the answer is correct.
Score: 1

Accepted Answers:
If v links to pages with high authority scores, its hub score increases.
If page v is linked to good hubs, its authority score increases.

2) State true or false: *1 point*
"Hub and Authority are Exclusionary"

- ○ True
- ⦿ False

Yes, the answer is correct.
Score: 1

Accepted Answers:
False

3) The main page of a site usually has _____ hub and _____ authority scores. *1 point*

- ○ High, low
- ○ Low, High
- ⦿ High, high
- ○ Low, Low

Yes, the answer is correct.
Score: 1

Accepted Answers:
High, high

Yes, the answer is correct.
Score: 1
Accepted Answers:
High, high

4)   4. What will be the page rank of nodes in figure 1?   *1 point*
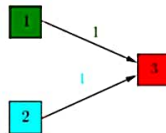
Figure 1

○ Node 1: 0, Node 2: 0, Node 3: 2
◉ Node 1: 0, Node 2: 0, Node 3: 1
○ Node 1: 0, Node 2: 0, Node 3: 0
○ None of these

No, the answer is incorrect.
Score: 0
Accepted Answers:
Node 1: 0, Node 2: 0, Node 3: 0

5)   If a network of n nodes is strongly connected, how many sets of equilibrium values exist?   *1 point*

◉ 1
○ n/2
○ log n
○ n/3

Yes, the answer is correct.
Score: 1
Accepted Answers:
1

Accepted Answers:
Node 1: 0, Node 2: 0, Node 3: 0

5) If a network of n nodes is strongly connected, how many sets of equilibrium values exist?   *1 point*

◉ 1
○ n/2
○ log n
○ n/3

Yes, the answer is correct.
Score: 1

Accepted Answers:
1

6) Which of the following is/are a dangling node in figure 2?   *1 point*
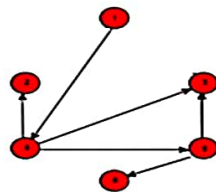
Figure 2

☐ 1
☑ 6
☑ 2
☑ 3

Yes, the answer is correct.
Score: 1

Accepted Answers:

☑ 3

7) While performing k hub-authority updates in Principle of Repeated Improvement process, what will happen if we use larger and larger values of   *1 point*
k?

☑ The normalized values actually converge to limits as k goes to infinity.

☑ The results stabilize so that continued improvement leads to smaller and smaller changes in the values.

☐ None of these

8) Which of the following properties are related to Markov matrix A?   *1 point*

☑ All entries are non-negative.

☑ sum of each column vector is equal to 1.

☑ A has an eigenvalue 1.

☐ Entries can be negative.

9) What happens to the magnitude of the hub and authority values with each update in hub authority computation?   *1 point*

☐ Decrease

☑ A has an eigenvalue 1.
☐ Entries can be negative.

Yes, the answer is correct.
Score: 1
Accepted Answers:
All entries are non-negative.
sum of each column vector is equal to 1.
A has an eigenvalue 1.

9) What happens to the magnitude of the hub and authority values with each update in hub authority computation?   *1 point*

○ Decrease
◉ Increase
○ Remains constant
○ None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
None of the above

10) Which of the following is correct with respect to normalizing weights in hubs and authorities?   *1 point*

○ The weights are normalized to ensure that the product of their squares is 1.
◉ The weights are normalized to ensure that the sum of their squares is 1.
○ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
The weights are normalized to ensure that the sum of their squares is 1.

Week 9: Assignment 9

The due date for submitting this assignment has passed.

Assignment submitted on 2021-09-28, 21:02 IST

1) State the following statements as true or false:
"The degree d_v of vertex v is its number of incident edges"   *1 point*

○ True
◉ False

Yes, the answer is correct.
Score: 1

Accepted Answers:
False

2) Complete the following sentence:
"The degree sequence _____ specify the graph"

○ does not uniquely
◉ uniquely
○ Depends on the graph

No, the answer is incorrect.
Score: 0

Accepted Answers:
does not uniquely

1 point

3) The shape of the Normal Curve is _____   *1 point*

○ does not uniquely

◉ uniquely

○ Depends on the graph

No, the answer is incorrect.
Score: 0

Accepted Answers:
does not uniquely

3) The shape of the Normal Curve is _____   *1 point*

◉ Bell Shaped

○ Flat

○ Circular

○ Spiked

Yes, the answer is correct.
Score: 1

Accepted Answers:
Bell Shaped

4) Normal Distribution is applied for _____   *1 point*

○ Irregular Random Variable

◉ Continuous Random Distribution

○ Discrete Random Variable

○ Uncertain Random Variable

Yes, the answer is correct.
Score: 1

Accepted Answers:
Continuous Random Distribution

5) Which of the following is the ingredient in generating power law?   *1 point*

○ preferential attachment

○ growth over time

◉ Both preferential attachment and growth over time

○ None of these

Score: 1
Accepted Answers:
Continuous Random Distribution

5) Which of the following is the ingredient in generating power law?   *1 point*

○ preferential attachment
○ growth over time
◉ Both preferential attachment and growth over time
○ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
Both preferential attachment and growth over time

6) State true or false about preferential attachment?   *1 point*
"New nodes prefer to attach to well-connected nodes over less-well connected nodes"

◉ True
○ False

Yes, the answer is correct.
Score: 1
Accepted Answers:
True

7) Which of the following is true for random network and real-world network?

☑ Real networks are the result of a growth process that continuously increases N.
☑ The random network model assumes that the number of nodes, N, is fixed.
☐ Nodes in real networks randomly choose their interaction partners.
☐ In random networks new nodes tend to link to the more connected nodes.

                                                                        1 point

Yes, the answer is correct.
Score: 1
Accepted Answers:
Real networks are the result of a growth process that continuously increases N.
The random network model assumes that the number of nodes, N, is fixed.

7) Which of the following is true for random network and real-world network?   *1 point*

- ☑ Real networks are the result of a growth process that continuously increases N.
- ☑ The random network model assumes that the number of nodes, N, is fixed.
- ☐ Nodes in real networks randomly choose their interaction partners.
- ☐ In random networks new nodes tend to link to the more connected nodes.

Yes, the answer is correct.
Score: 1
Accepted Answers:
Real networks are the result of a growth process that continuously increases N.
The random network model assumes that the number of nodes, N, is fixed.

8) Which of the following is true?   *1 point*

- ☑ The absence of preferential attachment leads to a growing network with a stationary but exponential degree distribution.
- ☐ The absence of growth leads to the gain of stationarity, forcing the network to converge to a complete graph.
- ☑ the absence of growth leads to the loss of stationarity, forcing the network to converge to a complete graph.
- ☐ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
The absence of preferential attachment leads to a growing network with a stationary but exponential degree distribution.
the absence of growth leads to the loss of stationarity, forcing the network to converge to a complete graph.

9) Suppose P(k) denotes the degree distribution of the network in figure 1, what is the value of P(2)+P(3)?   *1 point*

9) Suppose P(k) denotes the degree distribution of the network in figure 1, what is the value of P(2)+P(3)?   *1 point*

Figure 1

- ○ 5/6
- ◉ 1/2
- ○ 1/3
- ○ 1/6

10) Which of the following curve is the sure litmus test for detecting power law in a network?   *1 point*
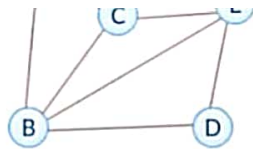
Figure 1

○ 5/6
◉ 1/2
○ 1/3
○ 1/6

No, the answer is incorrect.
Score: 0

Accepted Answers:
1/6

10) Which of the following curve is the sure litmus test for detecting power law in a network?

○ Between log f(k) vs k
○ Between log f(k) vs f(k)
◉ Between log f(k) vs log(k)
○ Between f(k) vs log(k)

Yes, the answer is correct.
Score: 1

Accepted Answers:
Between log f(k) vs log(k)

Course outline

How does an NPTEL online
course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

● Lecture 126 - Rich Get Richer
  - A Possible Reason

Week 10: Assignment 10

The due date for submitting this assignment has passed.

Due on 2021-10-06, 23:59 IST.

Assignment submitted on 2021-10-06, 21:21 IST

1) How the number of in-links to a given page be distributed?   *1 point*
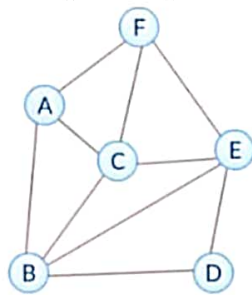
 ○ Normally
 ○ Poisson
 ○ Binomially
 ○ Uniformly

Yes, the answer is correct
Score 1
Accepted Answers
Normally

2) Which of the following is true?   *1 point*

 ○ The number of pages with k in-links should decrease exponentially in k, as k grows large
 ○ The number of pages with k in-links should increase exponentially in k, as k decreases
 ○ The number of pages with k in-links should increase exponentially in k, as k grows large
 ○ The number of pages with k in-links should decrease exponentially in k, as k decreases

Yes, the answer is correct
Score 1
Accepted Answers
The number of pages with k in-links should decrease exponentially in k, as k grows large

Week 10: Assignment 10

The due date for submitting this assignment has passed.

Assignment submitted on 2021-10-06, 21:21 IST

1) How the number of in-links to a given page be distributed?   *1 point*

- ⦿ Normally
- ◯ Poisson
- ◯ Binomially
- ◯ Uniformly

Yes, the answer is correct.
Score: 1

Accepted Answers:
Normally

2) Which of the following is true?   *1 point*

- ⦿ The number of pages with k in-links should decrease exponentially in k, as k grows large.
- ◯ The number of pages with k in-links should increase exponentially in k, as k decreases.
- ◯ The number of pages with k in-links should increase exponentially in k, as k grows large.
- ◯ The number of pages with k in-links should decrease exponentially in k, as k decreases.

Yes, the answer is correct.
Score: 1

Accepted Answers:
The number of pages with k in-links should decrease exponentially in k, as k grows large.

3) What is the fraction of web pages having in-degree k?   *1 point*

- ◯
  k^2
- ◯
  k

⊙ The number of pages with k in-links should decrease exponentially in k, as k grows large.
○ The number of pages with k in-links should increase exponentially in k, as k decreases.
○ The number of pages with k in-links should increase exponentially in k, as k grows large.
○ The number of pages with k in-links should decrease exponentially in k, as k decreases.

Yes, the answer is correct.
Score: 1
Accepted Answers:
The number of pages with k in-links should decrease exponentially in k, as k grows large.

3) What is the fraction of web pages having in-degree k?   *1 point*

○
k^2
○
k
○
$1/k$
⊙
$\frac{1}{k^2}$

Yes, the answer is correct.
Score: 1
Accepted Answers:
$\frac{1}{k^2}$

4) Which of the following are examples of scale-free networks?   *1 point*

☑ WWW
☑ Telephone networks
☐ friendship networks
☑ citation networks

Partially Correct.
Score: 0.75
Accepted Answers:
WWW
Telephone networks

Accepted Answers:
$\frac{1}{k^3}$

4) Which of the following are examples of scale-free networks? *1 point*

☑ WWW

☑ Telephone networks

☐ friendship networks

☑ citation networks

Partially Correct.
Score: 0.75
Accepted Answers:
WWW

Telephone networks

friendship networks

citation networks

5) State true or false for the following statement: *1 point*
"Curves of the type where the variable on the x-axis represents rank and y-axis represents frequency have no history"

○ True

◉ False

No, the answer is incorrect.
Score: 0
Accepted Answers:
True

6) Which of the following properties differentiate spread of epidemic from spread of idea? *1 point*

◉ The person has no choice

○ It is an invisible process

○ All of these

No, the answer is incorrect.
Score: 0
Accepted Answers:
All of these

○ All of these

No, the answer is incorrect.
Score: 0
Accepted Answers:
All of these

7) Which of the following is not an example of percolation?   *1 point*

○ Spread of epidemics
○ Gossip-based routing
○ Connectivity of unreliable networks
◉ Wireless nodes with Normal distribution

Yes, the answer is correct.
Score: 1
Accepted Answers:
Wireless nodes with Normal distribution

8) An individual node in the branching process model goes through three potential stages during the course of the epidemic. Which one of the   *1 point*
following describes a infectious stage?

○ Before the node has caught the disease
◉ The node has caught the disease and has some probability of infecting each of its neighbors.
○ The node has recovered from the disease.
○ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
The node has caught the disease and has some probability of infecting each of its neighbors.

9) Which of the following is true related to SIS model?   *1 point*

☑ Nodes can be infected, recover, and then be infected again.
☐ There is a Removed state.
☐ After a node is done with the Infectious state, it cycles back to the Susceptible state and is ready to catch the disease again.
☐ All of these

Partially Correct.

8) An individual node in the branching process model goes through three potential stages during the course of the epidemic. Which one of the following describes a infectious stage? **1 point**

○ Before the node has caught the disease

◉ The node has caught the disease and has some probability of infecting each of its neighbors.

○ The node has recovered from the disease.

○ None of these

Yes, the answer is correct.
Score: 1
Accepted Answers:
The node has caught the disease and has some probability of infecting each of its neighbors.

9) Which of the following is true related to SIS model? **1 point**

☑ Nodes can be infected, recover, and then be infected again.

☐ There is a Removed state.

☐ After a node is done with the Infectious state, it cycles back to the Susceptible state and is ready to catch the disease again.

☐ All of these

Partially Correct.
Score: 0.5
Accepted Answers:
Nodes can be infected, recover, and then be infected again.
After a node is done with the Infectious state, it cycles back to the Susceptible state and is ready to catch the disease again.

10) State True or False? **1 point**
"We can combine elements of the SIR and SIS models in a simple way, so that after an infected node recovers, it passes briefly through the R state on its way back to the S state."

◉ True

○ False

Yes, the answer is correct.
Score: 1
Accepted Answers:
True

1) In a small world, what is the expected distance between any two random nodes?   *1 point*

- ○ O(n)
- ● O(logn)
- ○ O(loglogn)
- ○ None of these

2) Why is the Milgram's experiment known as Six degrees of separation experiment?   *1 point*

- ☑ The result from the experiment shows that median =6
- ☐ The result from the experiment shows that mode=6
- ☑ The result from the experiment shows that average chain length = 6.5
- ☐ None of these

3) Which of the following are false facts about large networks from the Milgram's experiment?   *1 point*

- ○ Short paths are abundant
- ○ People, acting without any sort of global "map" of the network, are effective at collectively finding the short path
- ● None of these

4) State True or False   point
"According to Watts-Strogatz small-world network, Introducing a tiny amount of randomness—in the form of long-range weak ties is enough to make the world "small" with short paths between every pair of nodes."

- ● True
- ○ False

5) What is the main difference between a small world and a random world?   *1 point*

- ● Random network is a small world, but not navigable
- ○ Random network has much smaller average clustering coefficient, compared to that of the Watts-Strogatz small-world network
- ○ All of these
- ○ None of these

— None of these

4) State True or False: *1 point*

"According to Watts-Strogatz small-world network, Introducing a tiny amount of randomness–in the form of long-range weak ties is enough to make the world "small" with short paths between every pair of nodes."

● True
○ False

5) What is the main difference between a small world and a random world?   *1 point*

● Random network is a small world, but not navigable.
○ Random network has much smaller average clustering coefficient, compared to that of the Watts-Strogatz small-world network.
○ All of these
○ None of these

6) State True or False: *1 point*

"In a 2-D Watts-Strogatz model, for an efficient decentralised search, the ideal value of clustering exponent is 2 so that random links follow an inverse-square distribution."

● True
○ False

7) The Watt-Strogatz model creates a network of nodes using which of the concept?   *1 point*

○ Homophily
○ Weak ties
● Both homophily and weak ties
○ Neither homophily nor weak ties

8) In which of the following model, one end of each edge is rewired to another vertex independently and with probability p to a new vertex chosen randomly.   *1 point*

● Watts-Strogatz model
○ Milgram Model
○ Both Watts-Strogatz and Milgram models
○ Neither Watts-Strogatz nor Milgram models

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○ Homophily
○ Weak ties
● Both homophily and weak ties
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8) In which of the following model, one end of each edge is rewired to another vertex independently and with probability p to a new vertex chosen   *1 point*
randomly.

● Watts-Strogatz model
○ Milgram Model
○ Both Watts-Strogatz and Milgram models
○ Neither Watts-Strogatz nor Milgram model

9) The Watts-Strogatz model corresponds to the special case of Kleinberg's decentralized search model where q = ?   *1 point*

○ 3
○ 1
○ 2
● 0

10) In decentralized search, the _____ ties help one to better explore a region and the _____ ties allow one to search far away   *1 point*
regions of the network.

○ strong, strong
○ weak, weak
● strong, weak
○ weak, strong

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers

Week 12: Assignment 12

Your last recorded submission was on 2021-10-20, 20:43 IST   Due date: 2021-10-20, 23:59 IST.

1) In myopic search, the expected number of steps needed to reach target E[X] when $\alpha=1$ is   *1 point*

- ● $O(\log^2 n)$
- ○ $O(\log n)$
- ○ $O(n)$
- ○
  $O(n^{1-\alpha})$

2) State True or False   *1 point*
"When applying the standard k-shell decomposition to uncover the core of several example social networks, the resulting "innermost" structure ... to represent the "core" of complex networks."

- ○ True
- ● False

3) Myopic search constructs an exponentially smaller path i.e. proportional to ___?   *1 point*

- ● $O(\log^2 n)$
- ○ $O(\log n)$
- ○ $O(n)$
- ○ None of these

4) Which of the following statement is True?   *1 point*

Week 12: Assignment 12

Your last recorded submission was on 2021-10-20, 20:43 IST   **Due date: 2021-10-20, 23:59 IST.**

1) In myopic search, the expected number of steps needed to reach target E[X] when $\alpha=1$ is: *1 point*

- ⦿ $O(\log^2 n)$
- ◯ $O(\log n)$
- ◯ $O(n)$
- ◯
  $O(n^{1-\alpha})$

2) State True or False: *1 point*
"When applying the standard k-shell decomposition to uncover the core of several example social networks, the resulting "innermost" structure is most likely to represent the "core" of complex networks."

- ◯ True
- ⦿ False

3) Myopic search constructs an exponentially smaller path i.e. proportional to ___?   *oint*

- ⦿ $O(\log^2 n)$
- ◯ $O(\log n)$
- ◯ $O(n)$
- ◯ None of these

4) Which of the following statement is True?   *1 point*

- ◯ Pseudo-cores are the nodes which belong to the core as well as periphery of the network.
- ⦿ Pseudo-cores are the nodes which do not belong to the innermost core of the network but have equal spreading power (cascade capacity) as the innermost core.
- ◯ Pseudo-cores are the nodes which do not belong to the outermost periphery of the network but have equal spreading power (cascade capacity) as the

○ O(n)

○ None of these

4) Which of the following statement is True?   *1 point*

○ Pseudo-cores are the nodes which belong to the core as well as periphery of the network.

◉ Pseudo-cores are the nodes which do not belong to the innermost core of the network but have equal spreading power (cascade capacity) as the innermost core.

○ Pseudo-cores are the nodes which do not belong to the outermost periphery of the network but have equal spreading power (cascade capacity) as the outermost periphery.

○ None of these is correct

5) What is the time complexity of core number algorithm?   *1 point*

◉ O(n log n)

○ O($\log^2$ n)

○ O(n-1)

○ O(n^2)

6) State True or False: *1 point*
"The k-core subgraphs need to be necessarily connected"

○ True

◉ False
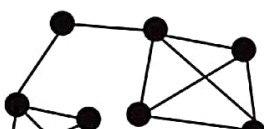
7) Complete the following statement related to figure 1:   *1 point*
The graph is composed of _____ cliques (complete subgraphs) of size _____ that are connected by a node x with a degree of 2.

○ O(n-1)

○ O(n²)

6) State True or False: *1 point*
"The k-core subgraphs need to be necessarily connected"

○ True
◉ False

7) Complete the following statement related to figure 1:   *1 point*
The graph is composed of _____ cliques (complete subgraphs) of size ____ that are connected by a node x with a degree of 2.

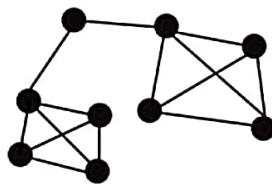Figure 1

◉ Two, four
○ One, three
○ Two, three
○ One, four

8) Let n_{max} and m_{max} be the number of vertices and number of edges in the degeneracy-core, how can the density of the degeneracy-core be   *1 point*
defined?

◉

◉ Two, four
○ One, three
○ Two, three
○ One, four

8) Let n_{max} and m_{max} be the number of vertices and number of edges in the degeneracy-core, how can the density of the degeneracy-core be defined?   *1 point*

◉

$$D_{max} = m_{max} \bigg/ \binom{n_{max}}{2}$$

○

$$D_{max} = n_{max} \bigg/ \binom{m_{max}}{2}$$

○

$$D_{max} = m_{max}/(n_{max})$$

○

$$D_{max} = n_{max}/(m_{max})$$

9)   State True or False: *oint*
"The core number algorithm is an exponential time algorithm"

○ True
◉ False

10) If a graph fits in memory, what is the running time complexity of core decomposition algorithm?   *1 point*

◉ O(n+m)
○ O(n²)
○ O(log n)
○ O(log log n)

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers