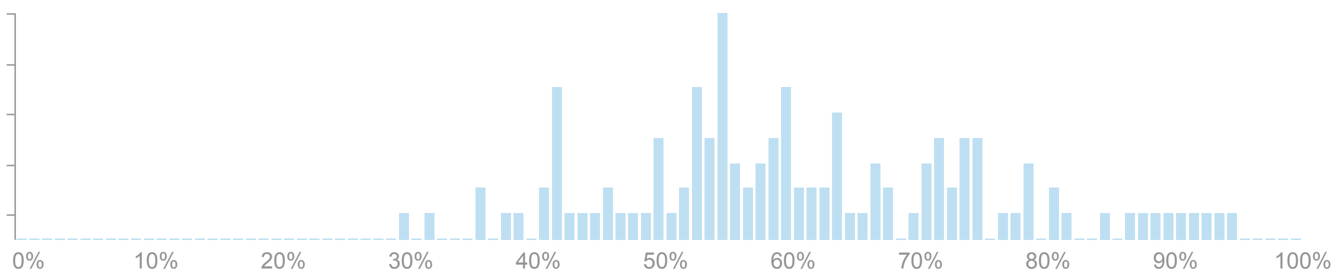
Quiz Summary

Section Filter ▾ Student Analysis

Item Analysis (https://canvas.asu.edu/files/45643429/download?download_frd=1&verifier=S6FiwtW2aS0x9hQYnTBRuwUuqabGUHk7ZTYJjXfT)

Average Score	High Score	Low Score	Standard Deviation	Average Time
61%	95%	30%	14.44	01:27:06



Question Breakdown

Attempts: 40 out of 40

Given the following preference lists and the matching M indicated by the asterisks, in the space below, list an unstable pair with respect to M, if one exists, or determine that no unstable pair exists. If you determine no unstable pair exists, write "N/A", otherwise, give the pair.

Men	1st	2nd	3rd
A	Y	*Z	X
B	Z	Y	*X
C	X	*Y	Z

Women	1st	2nd	3rd

X	A	*B	C
Y	A	*C	B
Z	B	*A	C

N/A		0 %	
AX	5 respondents	13 %	
BY	4 respondents	10 %	
CX	10 respondents	25 %	
BZ	36 respondents	**90 %**	✓
AY	32 respondents	**80 %**	✓
CZ	4 respondents	10 %	

57% answered correctly

Attempts: 36 out of 48

Consider the following turn-based propose-and-reject variant where we are given n men and n women and both men and women may initiate proposals. Let an unstable pair remain defined exactly as given in lecture.

Algorithm 1 EGALITARIAN PROPOSE-AND-REJECT

Initialize each person to be free
Turn ← ”men"
while Some man is free or some woman is free do
    if Turn is ”men” and some man is free then
        Choose an unengaged man m
        Let w be the first woman on m’s preference list to whom m has not yet proposed
        if w is free then
            Assign m and w to be engaged
        else if w prefers m to her fiance m_0 then
            Assign m and w to be engaged and set m_0 to be free
        else
            w rejects m
    if Turn is ”women” and some woman is free then
        Choose an unengaged woman w
        Let m be the first man on w’s preference list to whom w has not yet proposed
        if m is free then
            Assign m and w to be engaged
        else if m prefers w to his fiance w_0 then

```
            Assign m and w to be engaged and set w0 to be free
        else
            m rejects w
    if Turn is "men" then
        Turn ← "women"
    else if Turn is "women" then
        Turn ← "men"
```

The following assertion is made about the *egalitarian propose-and-reject algorithm*.

ASSERTION: This algorithm will never find a stable matching.

For the above assertion, either **prove** that it will never find a stable matching, or **disprove** it by providing a *counterexample.*

Briefly justify all statements.

Answers which scored in the top 27%	28 respondents	**58 %**	✓
Answers which scored in the middle 46%	7 respondents	**15 %**	✓
Answers which scored in the bottom 27%	13 respondents	**27 %**	✓

[**Download All Files (https://canvas.asu.edu/courses/95943/quizzes/73546 zip=1)**]

Attempts: 60 out of 60

The following statements all concern greedy algorithms. Select all statements below that are **true**.

22 respondents	37 %		3% answered correctly
11 respondents	18 %		
28 respondents	**47 %**	✓	
43 respondents	**72 %**	✓	
35 respondents	58 %		

Attempts: 103 out of 103

Assume that we have n jobs to schedule and that we are given the total processing time t_j and a target release time r_j, for each job j. We consider the problem of scheduling the jobs to be processed by a single resource such that only one job is processed at any point in time, and where the processor can never remain idle until it has completed all of the n jobs starting from time 0. The earliness e_j of job j measures how much earlier than the target release time we start processing the job and is equal to $\max(0, r_j - s_j)$, where s_j is the actual scheduled start time of job j. We would like to find a schedule that minimizes the maximum earliness of a job, i.e., to find a schedule that minimizes $max_j e_j$.

Select **all** options that correctly complete the following sentence: The same algorithm used for the problem of minimizing the maximum lateness as seen in lecture would work here if instead of ordering and scheduling the jobs in increasing order of their deadlines, we would order and schedule the jobs in...

decreasing order of their target release times.	23 respondents	22 %	
no order, since there is no ordering of the jobs that will make the algorithm guaranteed to work in this case.	19 respondents	18 %	
increasing order of their processing times.	18 respondents	17 %	
increasing order of their target release times.	51 respondents	**50 %**	✓
No Answer	17 respondents	17 %	

45% answered correctly

Attempts: 70 out of 70

Suppose you are given an undirected graph $G(V,E)$ with associated edge costs c_e, which are all positive and distinct and let T be a minimum spanning tree of G. Now replace all edge costs c_e by a new cost c_e' , thereby creating a new instance of the problem with the same graph with set of nodes V and set of edges E but with the modified edge costs. Circle all options below where T would still be guaranteed to be a minimum spanning tree of G in this new instance of the graph (with modified edge costs c_e'):

67 respondents	**96 %**	✓
37 respondents	**53 %**	✓
28 respondents	40 %	
45 respondents	**64 %**	✓

24% answered correctly

Attempts: 49 out of 49

Consider the offline caching problem. Suppose we have a cache C of size 2 (i.e., C can hold **two** items at a time). Let *a, b, e, b, b, c, d, f, e, g, b, f, a, b, c, d, f, e, a, b, c, c* be the sequence of item requests. Use the Farthest-in-Future algorithm and assume that you start from an empty cache. The configuration of the cache C after the first request for item g (in the tenth position of the sequence) is satisfied, is as follows:

+0.2

Discrimination Index ?

fg	4 respondents	8 %	
eg	6 respondents	12 %	
cg		0 %	
gf	38 respondents	**78 %**	✓
gd	1 respondent	2 %	

78% answered correctly

dg 0 %

Attempts: 56 out of 56

Identify which of the following items are true regarding a splay-tree with n nodes and splay-tree operations. **Select all that apply.**

17 respondents 30 %

32 respondents **57 %**

33 respondents **59 %**

40 respondents **71 %**

10 respondents 18 %

20% answered correctly

Attempts: 49 out of 69

Let $\alpha \in \mathbb{Z}_{\geq 2}$ be an arbitrary integer of value greater than or equal to 2. Suppose we are performing operations on a data structure D where the cost of the k^{th} operation o_k is defined by

$$cost(o_k) = \{k \text{ if } k \text{ is a power of } \alpha, \text{ and } 1 \text{ otherwise}$$

Use the ***accounting method*** to show that the amortized cost of an operation o_k is $O(1)$. Justify all statements briefly and show all steps.

Note that you will need to derive a dollar amount analytically for full points.

Answers which scored in the top 27% 21 respondents **30 %**

Answers which scored in the middle 46% 32 respondents **46 %**

Answers which scored in the bottom 27% 16 respondents **23 %**

[Download All Files (https://canvas.asu.edu/courses/95943/quizzes/73546 zip=1)](https://canvas.asu.edu/courses/95943/quizzes/73546)

Attempts: 54 out of 54

Suppose we are given a splay-tree T of n nodes and we present an operation called ELEMENT-CHECK(T ,e) that returns true if element e is the key of some node in splay-tree T and false otherwise. The algorithm works as follows: Beginning at the root of T, we walk down a branch of T searching for e making use of the binary search tree property (i.e. if the key of the currently visited node is less than e, we take the left branch, and if the key of the currently visited node is greater than e, we take the right branch). If a node with key e is found, we splay that node to the root of T and return true. If we reach a leaf node without finding a node with key e, we splay the leaf node and halt. Can we use the proof of amortized bounds for splay operations seen in lecture to conclude that the amortized cost of ELEMENT-CHECK is $O(\log n)$? **Select all that apply.**

	37 respondents	**69 %**	✓ 50% answered correctly
	3 respondents	6 %	
	34 respondents	**63 %**	✓
	11 respondents	20 %	
No Answer	7 respondents	13 %	

Attempts: 75 out of 120

Given a connected graph $G=(V,E)$ with distinct edge costs $c(e): e \in E$, a maximum bottleneck tree of G is a spanning tree $T(V,E')$ of G where the largest weight of any edge in E' is as large as possible. Give a polynomial time algorithm that is guaranteed to find some maximum bottleneck tree of G. Prove that your algorithm is correct and justify its polynomial running time.

The description of your algorithm need only be a high-level description as opposed to a detailed pseudocode description. Note that you may directly cite material from lectures, graded quizzes and graded assignments without reproducing it. For example, if you wish to cite the proof of correctness for interval scheduling, simply refer to “the proof of correctness for interval scheduling as seen in lecture...”

Answers which scored in the top 27%	34 respondents	**28 %**	✓
Answers which scored in the middle 46%	54 respondents	45 %	
Answers which scored in the bottom 27%	32 respondents	27 %	

Download All Files (https://canvas.asu.edu/courses/95943/quizzes/73546 zip=1)

Attempts: 51 out of 120

Please upload an image of your cheat sheet below.

Answers which scored in the top 27%	120 respondents	**100 %**	✓

Download All Files (https://canvas.asu.edu/courses/95943/quizzes/73546 zip=1)

Attempts: 31 out of 41

Consider the following turn-based propose-and-reject variant where we are given n men and n women and both men and women may initiate proposals. Let an unstable pair remain defined exactly as given in lecture.

Algorithm 1 EGALITARIAN PROPOSE-AND-REJECT

```
Initialize each person to be free
Turn ← "men"
while Some man is free or some woman is free do
    if Turn is "men" and some man is free then
        Choose an unengaged man m
        Let w be the first woman on m's preference list to whom m has not yet proposed
        if w is free then
            Assign m and w to be engaged
        else if w prefers m to her fiance m_0 then
            Assign m and w to be engaged and set m_0 to be free
        else
            w rejects m
    if Turn is "women" and some woman is free then
        Choose an unengaged woman w
        Let m be the first man on w's preference list to whom w has not yet proposed
        if m is free then
            Assign m and w to be engaged
        else if m prefers w to his fiance w_0 then
            Assign m and w to be engaged and set w_0 to be free
        else
            m rejects w
    if Turn is "men" then
        Turn ← "women"
    else if Turn is "women" then
        Turn ← "men"
```

The following assertion is made about the *egalitarian propose-and-reject algorithm*.

ASSERTION: *This algorithm is guaranteed to find a stable matching.*

For the above assertion, either **prove** that the algorithm will always produce a stable matching, or **disprove** it by providing a *counterexample.*

Briefly justify all statements.

Answers which scored in the top 27%	11 respondents	**27** %	✓
Answers which scored in the middle 46%	23 respondents	**56** %	✓
Answers which scored in the bottom 27%	7 respondents	**17** %	✓

Download All Files (https://canvas.asu.edu/courses/95943/quizzes/73546 zip=1)

Attempts: 59 out of 59

The following statements all concern greedy algorithms. Select all statements below that are **true**.

	6 respondents	10 %
	28 respondents	47 %
	52 respondents	**88 %**
Regarding the interval partitioning problem, there may not exist a schedule where the number of classrooms is equal to the depth of the interval set.	16 respondents	27 %
	42 respondents	**71 %**
No Answer	1 respondent	2 %

19% answered correctly

Attempts: 49 out of 49

Suppose you are given an undirected graph $G(V, E)$ with associated edge costs c_e, which are all positive and distinct and let P be a shortest-path from node s to node t in G. Now replace all edge costs c_e by a new cost c'_e , thereby creating a new instance of the problem with the same graph with set of nodes V and set of edges E but with the modified edge costs. Circle all options below where P would still be guaranteed to be a shortest path from s to t in this new instance of the graph (with modified edge costs c'_e):

	49 respondents	**100 %**
	10 respondents	20 %
	15 respondents	31 %
	22 respondents	45 %
No Answer	1 respondent	2 %

37% answered correctly

Attempts: 32 out of 51

Let $\alpha \in \mathbb{Z}_{\geq 2}$ be an arbitrary integer of value greater than or equal to 2. Suppose we are performing operations on a data structure D where the cost of the k^{th} operation o_k is defined by

$$cost(o_k) = \{k \text{ if } k \text{ is a power of } \alpha, \text{ and } 1 \text{ otherwise}$$

Use the ***potential method*** to show that the amortized cost of an operation o_k is $O(1)$. Justify all statements briefly and show all steps.

Note that you will need to carefully define a potential function and show that it is valid for full points.

Answers which scored in the top 27%	20 respondents	**39 %**
Answers which scored in the middle 46%	18 respondents	**35 %**
Answers which scored in the bottom 27%	13 respondents	**25 %**

Download All Files (https://canvas.asu.edu/courses/95943/quizzes/73546 zip=1)

Attempts: 37 out of 37

Given the following preference lists and the matching M indicated by the asterisks, in the space below, list an unstable pair with respect to M, if one exists, or determine that no unstable pair exists. If you determine no unstable pair exists, write "N/A", otherwise, give the pair.

Men	1st	2nd	3rd
A	X	*Z	Y
B	Y	*X	Z
C	X	*Y	Z

Women	1st	2nd	3rd
X	A	*B	C
Y	A	*C	B
Z	B	*A	C

BY	1 respondent	3 %
N/A	1 respondent	3 %
CX	6 respondents	16 %
AY	8 respondents	22 %
CZ	2 respondents	5 %
BZ	11 respondents	30 %
AX	29 respondents	**78 %**

59% answered correctly

Attempts: 22 out of 31

Consider the following turn-based propose-and-reject variant where we are given n men and n women and both men and women may initiate proposals. Let an unstable pair remain defined exactly as given in lecture.

Algorithm 1 EGALITARIAN PROPOSE-AND-REJECT

```
Initialize each person to be free
Turn ← "men"
while Some man is free or some woman is free do
    if Turn is "men" and some man is free then
        Choose an unengaged man m
        Let w be the first woman on m's preference list to whom m has not yet proposed
        if w is free then
            Assign m and w to be engaged
        else if w prefers m to her fiance m0 then
            Assign m and w to be engaged and set m0 to be free
        else
            w rejects m
    if Turn is "women" and some woman is free then
        Choose an unengaged woman w
        Let m be the first man on w's preference list to whom w has not yet proposed
        if m is free then
            Assign m and w to be engaged
        else if m prefers w to his fiance w0 then
            Assign m and w to be engaged and set w0 to be free
        else
            m rejects w
    if Turn is "men" then
        Turn ← "women"
    else if Turn is "women" then
        Turn ← "men"
```

The following assertion is made about the *egalitarian propose-and-reject algorithm*.

ASSERTION: *This algorithm will guarantee a stable matching that is neither female optimal nor male optimal.*

For the above assertion, either **prove** that it will always find a stable matching that is neither male nor female optimal, or **disprove** it by providing a *counterexample.*

Briefly justify all statements.

Answers which scored in the top 27%	8 respondents	**26 %**	✓
Answers which scored in the middle 46%	15 respondents	**48 %**	✓
Answers which scored in the bottom 27%	8 respondents	**26 %**	✓

Download All Files (https://canvas.asu.edu/courses/95943/quizzes/73546 zip=1)

Attempts: 30 out of 31

Consider the offline caching problem. Suppose we have a cache C of size 3 (i.e., C can hold **three** items at a time). Let *a, b, e, b, b, c, d, f, e, g, b, f, a, b, c, d, f, e, a, b, c, c* be the sequence of item requests. Use the Farthest-in-Future algorithm and assume that you start from an empty cache. The configuration of the cache C after the first request for item f (in the eighth position of the sequence) is satisfied, is as follows:

+0.25

Discrimination Index

bcf	1 respondent	3 %	84% answered correctly
feb		0 %	
fbe	26 respondents	**84 %**	✓
ebf	1 respondent	3 %	
bef	2 respondents	6 %	
No Answer	1 respondent	3 %	

Attempts: 62 out of 62

Identify which of the following items are true regarding a splay-tree with n nodes and splay-tree operations. **Select all that apply.**

	3 respondents	5 %	53% answered correctly
	61 respondents	**98 %**	✓
	11 respondents	18 %	
	20 respondents	32 %	
	61 respondents	**98 %**	✓
No Answer	2 respondents	3 %	

Attempts: 51 out of 51

Suppose we are given a splay-tree T of n nodes and we present an operation called ELEMENT-CHECK(T ,e) that returns true if element e is the key of some node in splay-tree T and false otherwise. The algorithm works as follows: Beginning at the root of T, we walk down a branch of T searching for e making use of the binary search tree property (i.e. if the key of the currently visited node is less than e, we take the left branch, and if the key of the currently visited node is greater than e, we take the right branch). If a node with key e is found, we splay that node to the root of T and return true. If we reach a leaf node without finding a node with key e, we simply return false and halt. Can we use the proof of amortized bounds for splay operations seen in lecture to conclude that the amortized cost of ELEMENT-CHECK is $O(\log n)$? **Select all that apply.**

	19 respondents	**37 %**	✓

	21 respondents	41 %	29% answered correctly
		0 %	
	22 respondents	43 %	
No Answer	8 respondents	16 %	

Attempts: 39 out of 40

Consider the offline caching problem. Suppose we have a cache C of size 3 (i.e., C can hold **three** items at a time). Let *a, b, e, b, b, c, d, f, e, g, b, f, a, b, c, d, f, e, a, b, c, c* be the sequence of item requests. Use the Farthest-in-Future algorithm and assume that you start from an empty cache. The configuration of the cache C after the first request for item g (in the tenth position of the sequence) is satisfied, is as follows:

+0.02

Discrimination Index

ebg	2 respondents	5 %	80% answered correctly
gbf		0 %	
fbg	32 respondents	**80 %**	
bfg	3 respondents	8 %	
dgf	2 respondents	5 %	
No Answer	1 respondent	3 %	

Attempts: 43 out of 43

Given the following preference lists and the matching M indicated by the asterisks, in the space below, list an unstable pair with respect to M, if one exists, or determine that no unstable pair exists. If you determine no unstable pair exists, write "N/A", otherwise, give the pair.

Men	1st	2nd	3rd
A	X	*Z	Y
B	Z	Y	*X
C	X	*Y	Z

Women	1st	2nd	3rd
X	A	*B	C
Y	A	*C	B

Z	B	*A	C

BY	5 respondents	12 %	70% answered correctly
N/A	2 respondents	5 %	
AY	6 respondents	14 %	
BZ	35 respondents	**81 %**	✓
CX	5 respondents	12 %	
AX	32 respondents	**74 %**	✓
CZ	5 respondents	12 %	