Montana State CS Graduating Senior Exam

Academic Year 2023-2024, 80 minutes.

Your performance helps us assess how well we are meeting our stated learning outcomes for computer science majors. To pass this exam, spend at least 45 minutes in order to provide a carefully reasoned answer to each question. This information will help us make improvements.

Name Xander Burger

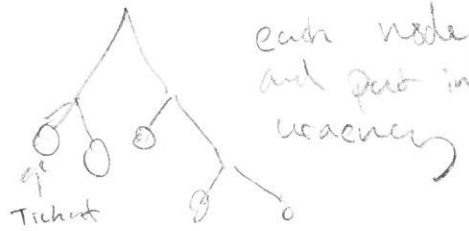
Major (Circle One): Computer Science (B.A.) or Computer Science B.S.

Question 1: A company uses a ticket system for customer service. Each ticket is given an urgency score when it is entered into the system. For example, a VIP customer would receive a higher urgency score than a regular customer. Assume that the urgency scores range from 1 to 10,000. The company's customer service team needs a way to find the most urgent ticket in the system and remove it when it has been addressed. New tickets can arrive at any time.

a) What simple data structure would best model this situation? Explain.

A red black tree. easy to sort and Rank

b) Describe one way in which this data structure could be implemented and draw a picture of that data structure.



each node is a ticket and put into the tree based on its urgency

c) Describe a second way in which this data structure could be implemented and draw a picture of that data structure.

you could take existing data then through it in the tree based on urgency



Question 2: Write a function in a language of your choice that has two parameters: a string and a character. The function should return the number of times that the character occurs in the string.

Your language of choice (e.g. Python):

Your solution:

```
def countLettersInString(string, char):
    count = 0
    For i in range(len(string)):
        If(string[i] == char):
            count++
    Return count
```

Question 3: Consider a singly linked list that contains **n** floating point numbers and is maintained in ascending order. An additional **k** floating point numbers will be added to the list, one at a time. You may assume that **k << n**.

Best case time complexity of algorithm:

O(1)

Explanation of best case time complexity:

Sense the list is maintained in accendy order at worst case k is lower than the last node meany it would have to go through the whole linked list bc for it is placed

Best case it is high than every other node and placed at front

Worst case time complexity of algorithm:

O(n)

Explanation of worst case time complexity:

sense the list is maintained in accend order at worse case k is lower than every other node meany you have to go through the whole list before it is placed

Question 4: List any extracurricular community involvement (e.g. the Gallatin Valley Food Bank or coaching), extracurricular university involvement (e.g. Engineering Ambassadors, Swing Cats, AWC or ACM) or paid internships (e.g. Workiva intern or Undergraduate Course Assistant) that you were involved with during your time at MSU. For each activity, (1) **provide** the name of the organization, (2) **describe** briefly your main activities and (3) **estimate** the total number of hours you spent.

Organization	*Main Activities*	*Hours Spent (estimate)*
Montana Innovation Partnership	intern web/design	~200 hours

Question 5: IEEE P7003 defines the Algorithmic Bias Standard.

a) Describe briefly what algorithmic bias is.

algorithms particularly machine learning algorithms which use data containing some sort of bias, leading to the further spreading of that bias.

b) Provide a hypothetical example of how algorithmic bias could manifest itself in college admissions software.

Maybe you have a data set that is used. Find out who the college should send emails to, but your data set only contains wealthy people and now only affluent students get emails from your college.

Question 6: In 2010 Oracle sued Google claiming copyright and patent infringement for 11,500 lines of Java API copied code. Google used this small subset of code from the JAVA API for their mobile platform operating system. Pick a side (Google or Oracle) to win this lawsuit and explain 3 possible impacts to the computing industry of this win.

Side you choose to win: google

First possible impact:

a presadent for more open code sharing.

Second possible impact:

loose Ideahs on ownership of Code

Third possible impact:

The continuation of google using code from smaller companys for profit

Question 7: In the ACM Code of Ethics and Professional Conduct, one ethical principle stated is to ***avoid harm***. Describe three different types of harm that the software of an autonomous, self-driving car might cause.

First type of harm:

hitting a pedestrian

Second type of harm:

trapping people in cars

Third type of harm:

Collection of sensative location data of users for profit

Question 8: Describe your one-year plan following graduation. If you plan to work, list where you have applied (the company and the position) and mention whether you have received any offers. If you plan to go to graduate school, list where you have applied (the school and the area of study) and mention whether you have received any acceptances.

I'm going to travel, maybe work on a farm. get away from a computer for abit

Question 9: List any organized social activities (e.g. SwingCats, church, a residence hall volleyball team) that you were involved with during your entire time at MSU. For each activity, (1) **provide** the name of the organization, (2) **estimate** the total number of hours you spent.

Organization Name	*Estimate Total Hours Spent*

Question 10: List any activities that you were involved with during your time at MSU that prepared you to work more effectively with teammates whose backgrounds are significantly different than your own. For each activity, (1) **describe** the activity and (2) **estimate** the total number of hours you spent.

Activity Description	*Hours Spent (estimate)*
ESof (423) Software team	180 +

Question 11: Name the most sophisticated version control system that you use and describe three nontrivial features it has.

Name of most sophisticated version control system: Git / github

Non-trivial feature 1:
branching

Non-trivial feature 2:
CI / automated testing

Non-trivial feature 3:
Naming commits

Question 12: During your time at MSU, list any major non-classroom, non-paid activities that you engaged in to help prepare for your computer science career. For example, you might have taught yourself a programming language or attended a workshop on a CS topic. For each activity, **estimate** the number of hours spent.

Activity Description	*Hours Spent (estimate)*
game design with godot	500+

Best wishes wrapping up the semester and in the future!

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Name Sage James

Major (Circle One): Computer Science B.A. or Computer Science B.S.

Question 1: A company uses a ticket system for customer service. Each ticket is given an urgency score when it is entered into the system. For example, a VIP customer would receive a higher urgency score than a regular customer. Assume that the urgency scores range from 1 to 10,000. The company's customer service team needs a way to find the most urgent ticket in the system and remove it when it has been addressed. New tickets can arrive at any time.

a) What simple data structure would best model this situation? Explain.

Priority queue, assigns urgency which would allow for an ordered, highest priority ticket line

b) Describe one way in which this data structure could be implemented and draw a picture of that data structure.

c) Describe a second way in which this data structure could be implemented and draw a picture of that data structure.

Question 2: Write a function in a language of your choice that has two parameters: a string and a character. The function should return the number of times that the character occurs in the string.

Your language of choice (e.g. Python):

Your solution:

```
def numString(s):
    num = 0
    for char in s:
        num += 1
    return num
```

```
print(numString("This is a String"))
```

16

Question 3: Consider a singly linked list that contains **n** floating point numbers and is maintained in ascending order. An additional **k** floating point numbers will be added to the list, one at a time. You may assume that **k << n**.

Best case time complexity of algorithm: O(n) n

Explanation of best case time complexity:

a singly linked list would have one variable that would be accounted for in big O, therefore represented by O(n)

Worst case time complexity of algorithm:

Explanation of worst case time complexity:

Question 4: List any extracurricular community involvement (e.g. the Gallatin Valley Food Bank or coaching), extracurricular university involvement (e.g. Engineering Ambassadors, Swing Cats, AWC or ACM) or paid internships (e.g. Workiva intern or Undergraduate Course Assistant) that you were involved with during your time at MSU. For each activity, (1) **provide** the name of the organization, (2) **describe** briefly your main activities and (3) **estimate** the total number of hours you spent.

Organization	*Main Activities*	*Hours Spent (estimate)*
web design TA	assisting lab	2 semesters
msu web+ dig intern	frontend dev	since July 2023, at least 10 hrs per week

Question 5: IEEE P7003 defines the Algorithmic Bias Standard.

a) Describe briefly what algorithmic bias is.

a bias unintentionally written into code

b) Provide a hypothetical example of how algorithmic bias could manifest itself in college admissions software.

perhaps the code shows only the canidates with the best ACT score on the top and therefore gives them a more likely chance to be admitted than students placed below them

Question 6: In 2010 Oracle sued Google claiming copyright and patent infringement for 11,500 lines of Java API copied code. Google used this small subset of code from the JAVA API for their mobile platform operating system. Pick a side (Google or Oracle) to win this lawsuit and explain 3 possible impacts to the computing industry of this win.

Side you choose to win: oracle

First possible impact:

protects original code for companies,

Second possible impact:

potentially companies make existing code harder to view, so if they are collecting "ideas" from elsewhere they might not get caught

Third possible impact:

bad code! developers are lucky to have so many resources available, if it becomes more secretive or risky we could risk having lots of bad code

Question 7: In the ACM Code of Ethics and Professional Conduct, one ethical principle stated is to ***avoid harm***. Describe three different types of harm that the software of an autonomous, self-driving car might cause.

First type of harm:

potentially harm humans physically if error is made

Second type of harm:

take jobs from taxi, lyft, uber etc. drivers, might harm their way of life ☹

Third type of harm:

might force software Engineers to make unethical choices while coding → where to swerve in critical situation
→ harm self
→ a bus of kids
→ motorcycle

Question 8: Describe your one-year plan following graduation. If you plan to work, list where you have applied (the company and the position) and mention whether you have received any offers. If you plan to go to graduate school, list where you have applied (the school and the area of study) and mention whether you have received any acceptances.

my one year plan is to find a job in web design, ux/ui design or potentially frontend

Ive started applying via jobboards (linkedin, handshake, etc) but havent heard back (upwards of 25+ applied for so far)

I interviewed for a role on the communications team @ msu but didnt get it due to other canidates having much more experience

Question 9: List any organized social activities (e.g. SwingCats, church, a residence hall volleyball team) that you were involved with during your entire time at MSU. For each activity, (1) **provide** the name of the organization, (2) **estimate** the total number of hours you spent.

Organization Name	*Estimate Total Hours Spent*
N/A	

Question 10: List any activities that you were involved with during your time at MSU that prepared you to work more effectively with teammates whose backgrounds are significantly different than your own. For each activity, (1) **describe** the activity and (2) **estimate** the total number of hours you spent.

Activity Description	*Hours Spent (estimate)*
having a background and passion for design made me constantly feel that i had a different viewpoint than my peers / teammates this allowed me to both shine and learn from others	

Question 11: Name the most sophisticated version control system that you use and describe three nontrivial features it has.

Name of most sophisticated version control system:

github

Non-trivial feature 1:

work with teammates easily

Non-trivial feature 2:

desktop app that allows quick push, pulls, commits etc

Non-trivial feature 3:

integrates w VS code easily

Question 12: During your time at MSU, list any major non-classroom, non-paid activities that you engaged in to help prepare for your computer science career. For example, you might have taught yourself a programming language or attended a workshop on a CS topic. For each activity, **estimate** the number of hours spent.

Activity Description	*Hours Spent (estimate)*
Google ux workshop on coursera	~2 months
portfolio building on different CMS websites (wix, shopify, Squarespace etc)	countless hours, I've been creating my own for 5+ years, constantly re-iterating)

Best wishes wrapping up the semester and in the future!

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Name Emma Keeley

Major (Circle One): (Computer Science B.A.) or Computer Science B.S.

Question 1: A company uses a ticket system for customer service. Each ticket is given an urgency score when it is entered into the system. For example, a VIP customer would receive a higher urgency score than a regular customer. Assume that the urgency scores range from 1 to 10,000. The company's customer service team needs a way to find the most urgent ticket in the system and remove it when it has been addressed. New tickets can arrive at any time.

a) What simple data structure would best model this situation? Explain.

Merge Sort

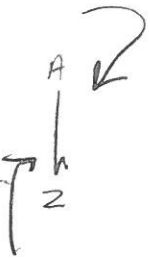
b) Describe one way in which this data structure could be implemented and draw a picture of that data structure.

Data structure used to sort & rank items in the list in decreasing order



c) Describe a second way in which this data structure could be implemented and draw a picture of that data structure.

Data structure used to sort & rank items in the list in ascending order



Question 2: Write a function in a language of your choice that has two parameters: a string and a character. The function should return the number of times that the character occurs in the string.

Your language of choice (e.g. Python):

Your solution:

Question 3: Consider a singly linked list that contains **n** floating point numbers and is maintained in ascending order. An additional **k** floating point numbers will be added to the list, one at a time. You may assume that **k << n**.

Best case time complexity of algorithm:

N

Explanation of best case time complexity:

fastest time complexity

Worst case time complexity of algorithm:

N log N

Explanation of worst case time complexity:

Slowest time complexity

Question 4: List any extracurricular community involvement (e.g. the Gallatin Valley Food Bank or coaching), extracurricular university involvement (e.g. Engineering Ambassadors, Swing Cats, AWC or ACM) or paid internships (e.g. Workiva intern or Undergraduate Course Assistant) that you were involved with during your time at MSU. For each activity, (1) **provide** the name of the organization, (2) **describe** briefly your main activities and (3) **estimate** the total number of hours you spent.

Organization	*Main Activities*	*Hours Spent (estimate)*
Wealthvest	Business Analyst Intern	1000
Exchange Club → Butte	Volunteer / member	50
Food Bank of Butte	Volunteer (summer)	200
Finance Club	Member	50
Women in Engineering	Member	100

Question 5: IEEE P7003 defines the Algorithmic Bias Standard.

a) Describe briefly what algorithmic bias is.

Algorithmic bias is when a algorithum looks for specific items rather than something as a whole. Algorithums lack judgement & look for key indicators

b) Provide a hypothetical example of how algorithmic bias could manifest itself in college admissions software.

algorithmic bias can be present in this situation because the algorithums used are looking for key attributes of the prospective student rather than looking at the student as a whole. This process could lead to the acceptance & rejections of the wrong people

Question 6: In 2010 Oracle sued Google claiming copyright and patent infringement for 11,500 lines of Java API copied code. Google used this small subset of code from the JAVA API for their mobile platform operating system. Pick a side (Google or Oracle) to win this lawsuit and explain 3 possible impacts to the computing industry of this win.

Side you choose to win: Google

First possible impact: Establish rules for Leagal Access to the API's

* Google is allowed to use

Second possible impact:

Set standards for patent & copyright infridgement

Third possible impact:

* The winner of this case will be able to be used as an example in similar cases to follow

Question 7: In the ACM Code of Ethics and Professional Conduct, one ethical principle stated is to ***avoid harm***. Describe three different types of harm that the software of an autonomous, self-driving car might cause.

First type of harm: Physical Harm

* Software malfunctions can hurt passengers pedestrians or other passengers in other vehicles

Second type of harm: Security Harm

Malfunctioning security systems could cause owner data leaks or something as major as stolen car if proper owner information isn collected

Third type of harm: Ethical Harm

* Software doesnt not have feelings or ethics, so in situations when judgement is necessary, the software will not know how to proceed & may malfunction

Question 8: Describe your one-year plan following graduation. If you plan to work, list where you have applied (the company and the position) and mention whether you have received any offers. If you plan to go to graduate school, list where you have applied (the school and the area of study) and mention whether you have received any acceptances.

One-year from now I plan to be working. I am a double major w/a BA degree in CS + a BS degree in Finance I have had sereral offers the finance field. Unfortunatly, I have had to turn those down (DA Davidson, Fisher, Edward Jones, + New York Life) because I am planning on staying in Bozeman. Currently, I am working as an Intern at Wealthvest as a Brssiness Analysist working in Salesforce. I am expecting an offer from them & plan on accepting it. I am currently getting my Saleforce Admin certification. I have thought a bit about Law school and may choose that route later on

Question 9: List any organized social activities (e.g. SwingCats, church, a residence hall volleyball team) that you were involved with during your entire time at MSU. For each activity, (1) **provide** the name of the organization, (2) **estimate** the total number of hours you spent.

Organization Name	*Estimate Total Hours Spent*
Catholic Church	200
Cycling Studio	200
Skiing	200
Softball	700
Running club	50

Question 10: List any activities that you were involved with during your time at MSU that prepared you to work more effectively with teammates whose backgrounds are significantly different than your own. For each activity, (1) **describe** the activity and (2) **estimate** the total number of hours you spent.

Activity Description	*Hours Spent (estimate)*
Finance Club	50
Web Dev w/ Business Partner	200
Sports Clubs	50
Internship	1000
Study Abroad	1000 (6 months)

Question 11: Name the most sophisticated version control system that you use and describe three nontrivial features it has.

Name of most sophisticated version control system:

Non-trivial feature 1:

Non-trivial feature 2:

Non-trivial feature 3:

Question 12: During your time at MSU, list any major non-classroom, non-paid activities that you engaged in to help prepare for your computer science career. For example, you might have taught yourself a programming language or attended a workshop on a CS topic. For each activity, **estimate** the number of hours spent.

Activity Description	*Hours Spent (estimate)*
Code Academy	500

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Name Jacob Rivers

Major (Circle One): (Computer Science B.A.) or Computer Science B.S.

Question 1: A company uses a ticket system for customer service. Each ticket is given an urgency score when it is entered into the system. For example, a VIP customer would receive a higher urgency score than a regular customer. Assume that the urgency scores range from 1 to 10,000. The company's customer service team needs a way to find the most urgent ticket in the system and remove it when it has been addressed. New tickets can arrive at any time.

a) What simple data structure would best model this situation? Explain.

A priority queue. Priority queue's are able to process customers in a first in/ first out way but also alter the FIFO logic by assigning higher or lower priority to each customer.

b) Describe one way in which this data structure could be implemented and draw a picture of that data structure.

A slow but "technically" correct solution:
create a 10,000 index empty array. Each new customer is assigned to the index of their priority score. The array is traversed each time a new ticket is to be removed, the first index with a customer in it is the highest priority customer.

c) Describe a second way in which this data structure could be implemented and draw a picture of that data structure.

Question 2: Write a function in a language of your choice that has two parameters: a string and a character. The function should return the number of times that the character occurs in the string.

Your language of choice (e.g. Python):

Your solution: Something like...

```
// a java fuction that performs a search for a character
// in a string and returns the number of times that
// character occurs.
public int howManyOfLetter(String s, char c){
    int count = 0;
    for(i=0; i= s.length; s++){
        Char currentChar = s[i];
        if(currentChar == c){
            count ++;
        }
    }
    return count;
}
```

Question 3: Consider a singly linked list that contains **n** floating point numbers and is maintained in ascending order. An additional **k** floating point numbers will be added to the list, one at a time. You may assume that **k << n**.

Best case time complexity of algorithm:

$O(n)$

Explanation of best case time complexity:

If the K floating point numbers being added are all ordered biggest to smallest and are all smaller than every number in n then every number can be inserted at the front of the SLL without traversing it. The number of operations will be n as there are K numbers to be inserted, and complexity changes linearly with the size of K so we expect O(n) for best case runtim

Worst case time complexity of algorithm:

$O(n^2)$

Explanation of worst case time complexity:

Each number in K is ordered from smallest to largest and every number in K is larger than every number in n. Then every number in K will have to traverse the entire SLL before being inserted at the end.

Question 4: List any extracurricular community involvement (e.g. the Gallatin Valley Food Bank or coaching), extracurricular university involvement (e.g. Engineering Ambassadors, Swing Cats, AWC or ACM) or paid internships (e.g. Workiva intern or Undergraduate Course Assistant) that you were involved with during your time at MSU. For each activity, (1) **provide** the name of the organization, (2) **describe** briefly your main activities and (3) **estimate** the total number of hours you spent.

Organization	*Main Activities*	*Hours Spent (estimate)*
AWC	attending meetings	≈80 hrs
Undergrad Courses Assistant	Spring 2024 CA for CS145 Web Design	≈140 hrs

1 hr / wk
8 semesters x
16 wks

Question 5: IEEE P7003 defines the Algorithmic Bias Standard.

a) Describe briefly what algorithmic bias is.

Algorithmic bias has many many possible definitions / interpretations but one way to describe it is that an algorithm (set of instructions) can only produce results which are based on the quantifiable inputs which the algorithm receives, biasing it against unquantifiable or other ignored data that it cannot treat in its calculations

b) Provide a hypothetical example of how algorithmic bias could manifest itself in college admissions software.

If a college admissions software heavily favors, for example GPA of applicants, to the exclusion of other metrics (sports, volunteering, work or extracurricular activities) because GPA is more easily measured / quatified, then this particular algorithm would be said to be biased against applicants who have lower GPAs. This can be either accepted or rejected as a useful algorithm by the school's administration, but it doesn't change the fact that the alg. can only treat the inputs that it is given, and excludes the non-quantifiable aspects of candidates,

Question 6: In 2010 Oracle sued Google claiming copyright and patent infringement for 11,500 lines of Java API copied code. Google used this small subset of code from the JAVA API for their mobile platform operating system. Pick a side (Google or Oracle) to win and explain 3 possible impacts to the computing industry of this win.

Side you choose to win: Google

First possible impact:
Code is not copyrightable and businesses begin taking entire codebases from other businesses, slapping their name on another company's code with a few name changes, and start selling duplicate services.

Second possible impact:
Companies become very serious about guarding their codebases and protecting them from being leaked or shared with the public.

Third possible impact:
Private companies are regularly eaten up by larger companies who copy their codebase but can afford more marketing.

Question 7: In the ACM Code of Ethics and Professional Conduct, one ethical principle stated is to ***avoid harm***. Describe three different types of harm that the software of an autonomous, self-driving car might cause.

First type of harm: Harm to pedestrians, who the car fails to detect and runs into.

Second type of harm: Harm to passengers who are injured / killed in any accidents caused by faults in the navigation system.

Third type of harm: Harm to property damaged by collisions stemming from the navigation system failing to detect / avoid objects in its environment.

Question 8: Describe your one-year plan following graduation. If you plan to work, list where you have applied (the company and the position) and mention whether you have received any offers. If you plan to go to graduate school, list where you have applied (the school and the area of study) and mention whether you have received any acceptances.

I'm honestly burnt out by school and don't feel confident in the CS education I've recieved at MSU. I've applied to a teaching program in Japan (JET) to teach english as a forcign language again (something I did when I was younger). I have not recieved a reply yet. I also have applied to a Mandarin language program in Taiwan and hope to get a schdarship to study there for a year. If these options don't work out I will try to find work in tech/computing but I don't really feel that I am likely to pass interviews or find a software dev. job. I've get the sense that I'm not really prepared to work in the field of CS.

Question 9: List any organized social activities (e.g. SwingCats, church, a residence hall volleyball team) that you were involved with during your entire time at MSU. For each activity, (1) **provide** the name of the organization, (2) **estimate** the total number of hours you spent.

Organization Name	*Estimate Total Hours Spent*
Chinese Culture Club	120

Question 10: List any activities that you were involved with during your time at MSU that prepared you to work more effectively with teammates whose backgrounds are significantly different than your own. For each activity, (1) **describe** the activity and (2) **estimate** the total number of hours you spent.

Activity Description	*Hours Spent (estimate)*
AWC	160

Question 11: Name the most sophisticated version control system that you use and describe three nontrivial features it has.

Name of most sophisticated version control system:

I just use regular old Git.

Non-trivial feature 1:

Branching - ability to create copies of the project where changes can be segregated from the rest of the project for experimentation and merged later.

Non-trivial feature 2:

Reversion - ability to roll back to earlier commits/versions of a project.

Non-trivial feature 3:

Cloning - can clone code repositories from other sources to the local machine.

Question 12: During your time at MSU, list any major non-classroom, non-paid activities that you engaged in to help prepare for your computer science career. For example, you might have taught yourself a programming language or attended a workshop on a CS topic. For each activity, **estimate** the number of hours spent.

Activity Description	*Hours Spent (estimate)*
Courses on brilliant.org	200 hrs
courses on LLM architecture/training	50 hrs
taught myself linear algebra from online Textbooks	80 hrs
JetBrains academy tutorials	100 hrs
Lots of Youtube tutorials various topics	250 hrs

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Name Josiah Shirley

Major (Circle One): Computer Science B.A. or Computer Science B.S.

Question 1: A company uses a ticket system for customer service. Each ticket is given an urgency score when it is entered into the system. For example, a VIP customer would receive a higher urgency score than a regular customer. Assume that the urgency scores range from 1 to 10,000. The company's customer service team needs a way to find the most urgent ticket in the system and remove it when it has been addressed. New tickets can arrive at any time.

a) What simple data structure would best model this situation? Explain.

Priority queue: Puts tickets in order of urgency with highest urgency at the top.

b) Describe one way in which this data structure could be implemented and draw a picture of that data structure.

A linked list where new tickets are inserted at the correct position (highest urgency first, etc.)



c) Describe a second way in which this data structure could be implemented and draw a picture of that data structure.

this would be bad! → An array with the highest urgency tickets at the front



Question 2: Write a function in a language of your choice that has two parameters: a string and a character. The function should return the number of times that the character occurs in the string.

Your language of choice (e.g. Python): Python

Your solution:

```
def char_counter(phrase, letter) -> int:
    occurences = 0
    phrase = str(phrase)      # make sure the phrase
    for char in phrase:       #is a string.
        if char == letter:
            occurences += 1
    return occurences
```

Question 3: Consider a singly linked list that contains **n** floating point numbers and is maintained in ascending order. An additional **k** floating point numbers will be added to the list, one at a time. You may assume that **k << n**.

Best case time complexity of algorithm:

$O(k)$

Explanation of best case time complexity:

All values are smaller than all previous values and are added to the front each time. k operations occur.

Worst case time complexity of algorithm:

$O(kn)$

Explanation of worst case time complexity:

All values are the largest in the current list; the entire list is searched through each time. For each insertion, n operations are performed.

Question 4: List any extracurricular community involvement (e.g. the Gallatin Valley Food Bank or coaching), extracurricular university involvement (e.g. Engineering Ambassadors, Swing Cats, AWC or ACM) or paid internships (e.g. Workiva intern or Undergraduate Course Assistant) that you were involved with during your time at MSU. For each activity, (1) **provide** the name of the organization, (2) **describe** briefly your main activities and (3) **estimate** the total number of hours you spent.

Organization	*Main Activities*	*Hours Spent (estimate)*
undergraduate scholars program	Research	60 hours

Question 5: IEEE P7003 defines the Algorithmic Bias Standard.

a) Describe briefly what algorithmic bias is.

Algorithmic bias occurs when the intended probabilities of outcomes do not match the actual probabilities of outcomes (i.e. an algorithm may be biased towards certain outcomes

b) Provide a hypothetical example of how algorithmic bias could manifest itself in college admissions software.

An algorithm may admit more students with lower GPA's than intended due to algorithmic bias towards those students.

Question 6: In 2010 Oracle sued Google claiming copyright and patent infringement for 11,500 lines of Java API copied code. Google used this small subset of code from the JAVA API for their mobile platform operating system. Pick a side (Google or Oracle) to win this lawsuit and explain 3 possible impacts to the computing industry of this win.

Having a decision on this realistically would require much more information.

Side you choose to win: Google

First possible impact:

More code (even some Proprietary code) is considered Publican domain.

Second possible impact:

Companies Put greater security/secrecy around their software.

Third possible impact:

Software companies use Proprietary software more freely than before.

Question 7: In the ACM Code of Ethics and Professional Conduct, one ethical principle stated is to ***avoid harm***. Describe three different types of harm that the software of an autonomous, self-driving car might cause.

First type of harm:

Destroying pedestrians or property

Second type of harm:

Injuring the passengers

Third type of harm:

Stranding the passenger(s) in the middle of nowhere.

Question 8: Describe your one-year plan following graduation. If you plan to work, list where you have applied (the company and the position) and mention whether you have received any offers. If you plan to go to graduate school, list where you have applied (the school and the area of study) and mention whether you have received any acceptances.

I have applied to work at Heritage Christian School as a teacher.

Question 9: List any organized social activities (e.g. SwingCats, church, a residence hall volleyball team) that you were involved with during your entire time at MSU. For each activity, (1) **provide** the name of the organization, (2) **estimate** the total number of hours you spent.

Organization Name	*Estimate Total Hours Spent*
Church	400 hours
Chess club	50 hours
Cru	100 hours

Question 10: List any activities that you were involved with during your time at MSU that prepared you to work more effectively with teammates whose backgrounds are significantly different than your own. For each activity, (1) **describe** the activity and (2) **estimate** the total number of hours you spent.

Activity Description	*Hours Spent (estimate)*
Group Projects (in class)	50 hours

Question 11: Name the most sophisticated version control system that you use and describe three nontrivial features it has.

Name of most sophisticated version control system: Git Hub

Non-trivial feature 1:

Branch merging

Non-trivial feature 2:

Cloud-Based Repository Sharing

Non-trivial feature 3:

Continuous integration Compatibility

Question 12: During your time at MSU, list any major non-classroom, non-paid activities that you engaged in to help prepare for your computer science career. For example, you might have taught yourself a programming language or attended a workshop on a CS topic. For each activity, **estimate** the number of hours spent.

Activity Description	*Hours Spent (estimate)*
Building systems (hardware and software for clients)	30 hours

Best wishes wrapping up the semester and in the future!