Midterm 1

ⓘ This is a preview of the published version of the quiz

Started: Sep 20 at 8:44pm

Quiz Instructions

Question 1

1 pts

What translates Python code into machine code given an instruction set?

○ process

○ [✓ interpreter]

○ CPU

○ operating system

Question 2

1 pts

(Fill in the blank) In order to avoid a ghost commit, your head should always points to a ______when making a commit.

○ commit

○ [✓ branch]

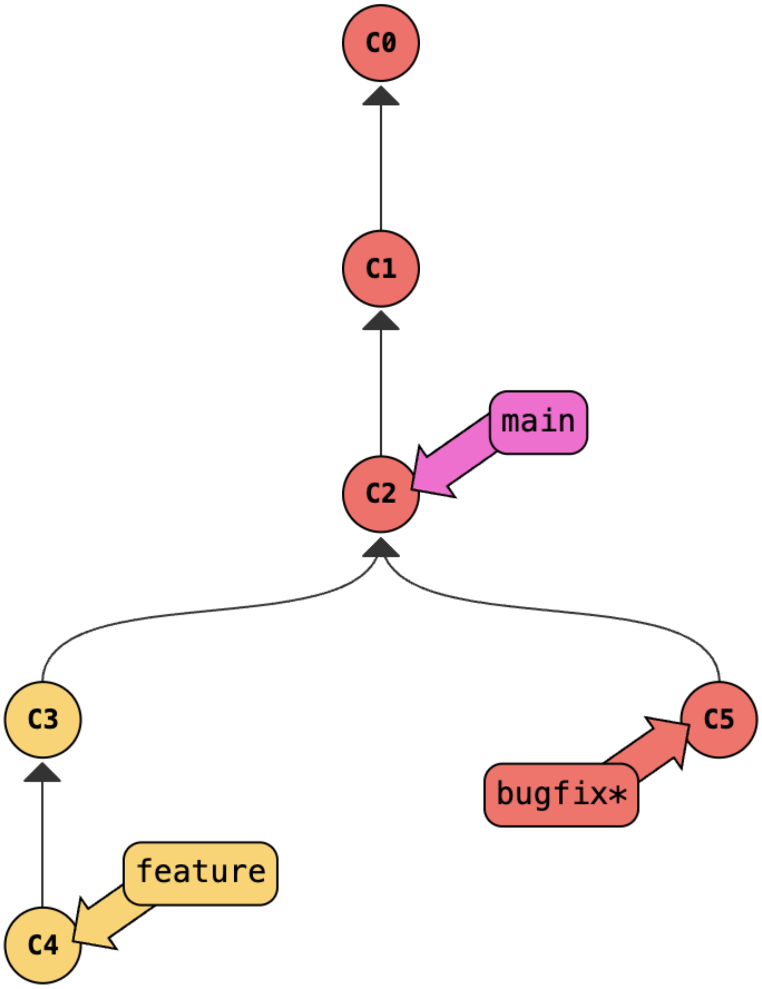
○ tag

Question 3

1 pts

The following graph indicate the current status of your repository, which of the following git commands will result in a **fast-forwarding** merge?

Hint: Please note where the head is currently pointing to.



○ git checkout main; git merge feature

○ git checkout feature; git merge main

○ git merge main

○ git checkout feature; git merge bugfix

○ git merge feature

Question 4

1 pts

```
def magic(a, b):
    while True:
        yield a * b
        a = b
        b = a + b

gen = magic(3, 2)

print(next(gen))
print(next(gen))
print(next(gen))
```

What does the above code snippet print?

○ [✓ 6 8 32]

○ 6 25 100

○ 3 2 6

○ 6 15 24

Question 5

1 pts

Suppose `N` is an integer. What is the complexity of the following code snippet?

```
sum = 0
for i in range(N):
    for j in range(i):
        sum += j
```

○ O(N)

○ O(N log N)

○ [✓ O(N**2)]

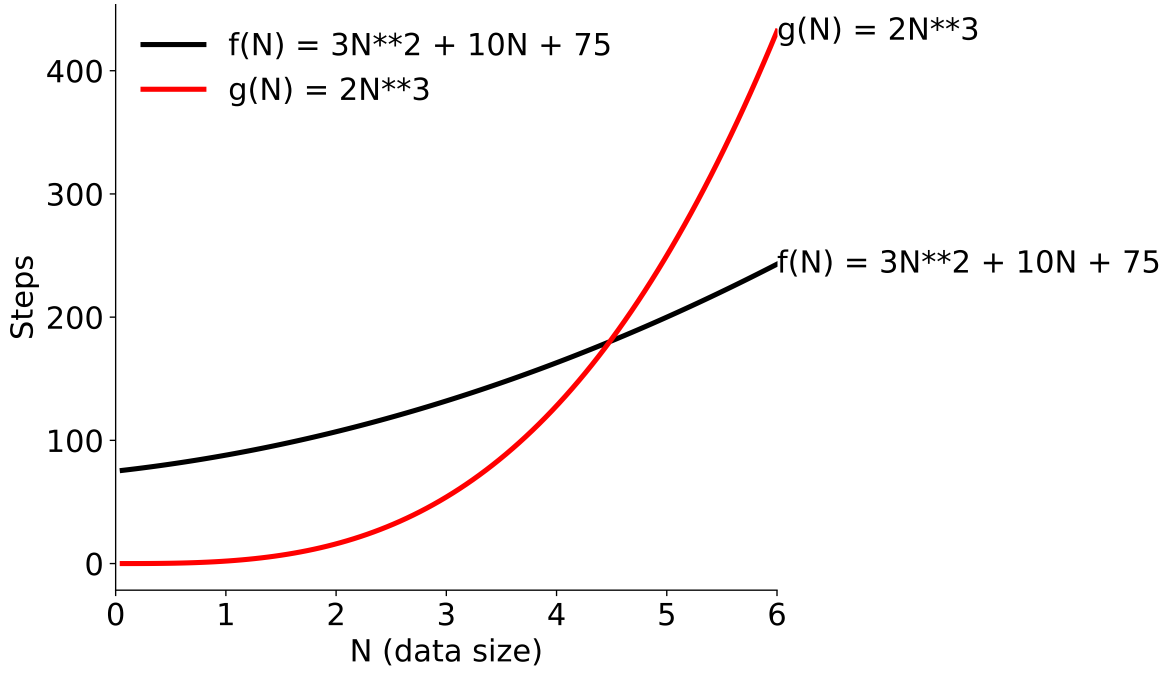
○ O(log N)

Question 6

1 pts

Recall that $f(N) \in O(g(N))$ if for some fixed constant C , $f(N) \leq C \cdot g(N)$ for large N values.

We want to show $f(N) \in O(g(N))$ for the graph below. If $C = 1$, what is the **LOWEST** value that N needs to be greater than or equal to?



○ 5

○ 200

○ 100

○ 2

○ 3

○ 6

Question 7

1 pts

Which of the following will correctly run `git status` in the "CS320-SU23" directory using `check_output`?

○ check_output("git status")

○ check_output(cwd = "CS320-SU23", ["git", "status"])

○ check_output("git status", cwd = "CS320-SU23")

○ check_output(["git", "status"], cwd = "CS320-SU23")

Question 8

1 pts

L is a list of N elements and L2 = [1,2,3]. Which of the following operations on L has the O(N) complexity?

1. `L.pop(-10)`
2. `len(L)`
3. `max(L)`
4. `L.insert(10, "a")`
5. `L1.extend(L2)`
6. `L1[L2[1]]`

○ 3 and 4

○ 1, 4, and 5

○ 3, 4, and 5

○ 2 and 3

○ 2, 3, and 4

○ 1, 3, and 4

Question 9

1 pts

```
speaker_settings = {"volume": 1}

class CustomMultiplierContext:
    def __init__(self, multiplier):
        self.multiplier = multiplier

    def __enter__(self):
        self.old_volume = speaker_settings["volume"]
        speaker_settings["volume"] *= self.multiplier

    def __exit__(self, exc_type, exc_value, traceback):
        speaker_settings["volume"] = self.old_volume

print(speaker_settings["volume"])
with CustomMultiplierContext(4):
    print(speaker_settings["volume"])
    with CustomMultiplierContext(2):
        print(speaker_settings["volume"])
        with CustomMultiplierContext(3):
            print(speaker_settings["volume"])
        print(speaker_settings["volume"])
    print(speaker_settings["volume"])
print(speaker_settings["volume"])
```

What does the above code snippet print?

○ 1 1 1 1 1 1 1

○ 1 4 8 24 24 24 24

○ [✓ 1 4 8 24 8 4 1]

○ 1 4 2 3 2 4 1

Question 10

1 pts

```
class Course:
    def __init__(self, name, number, instructor, semester="SU", year=2023):
        self.name = name
        self.number = number
        self.instructor = instructor
        self.semester = semester
        self.year = year

c = Course(...)
```

What is the minimum number of positional arguments is passed into Course.__init__ to create and initiate the Course object on the last line?

○ [✓ 4]

○ 3

○ 5

○ 6

Question 11

1 pts

```
class Pyramid:
    def volume(self):
        return self.base_area() * self.height / 3

    def base_area(self):
        return 0

class RectangularPyramid(Pyramid):
    def __init__(self, base_w, base_h, height):
        self.base_w = base_w
        self.base_h = base_h
        self.height = height

    def base_area(self):
        return self.base_w * self.base_h

class SquarePyramid(RectangularPyramid):
    def __init__(self, base_l, height):
        super().__init__(base_l,base_l,height)
```

Given the above code snippet, which methods are called in order when we run the following two lines?

```
my_pyramid = SquarePyramid(2, 3)
my_pyramid.volume()
```

○ SquarePyramid.__init__, RectangularPyramid.__init__, Pyramid.volume

○ SquarePyramid.__init__, Pyramid.volume, RectangularPyramid.base_area

○ [✓ SquarePyramid.__init__, RectangularPyramid.__init__, Pyramid.volume, RectangularPyramid.base_area]

○ SquarePyramid.__init__, RectangularPyramid.__init__, Pyramid.volume, Pyramid.base_area

Question 12

1 pts

I want to display information of an object with customizable colors and fonts in jupyter notebook. Which of the following special methods should I implement to accomplish my goal?

○ __repr__

○ _repr_svg

○ __str__

[✓ ○ _repr_html]

Question 13

1 pts

```
def foo(num):
    if num <= 1:
        return 1
    return foo(num - 1) + 2 * foo(num - 2)

print(foo(5))
```

What does the above code snippet print?

[✓ ○ 21]

○ 11

○ 41

○ 8

Question 14

1 pts

```
result = []

def magic(a,b):
    if len(a) == 0 and len(b) == 0:
        return
    elif len(a) < len(b):
        result.append(b[-1])
        magic(a, b[:-1])
    else:
        result.append(a[-1])
        magic(a[:-1], b)

magic([1,2,3,4], [5,6])
```

What is `result` after running the above recursive function?

○ [4,3,6,2,5,1]

○ [1,2,3,5,4,6]

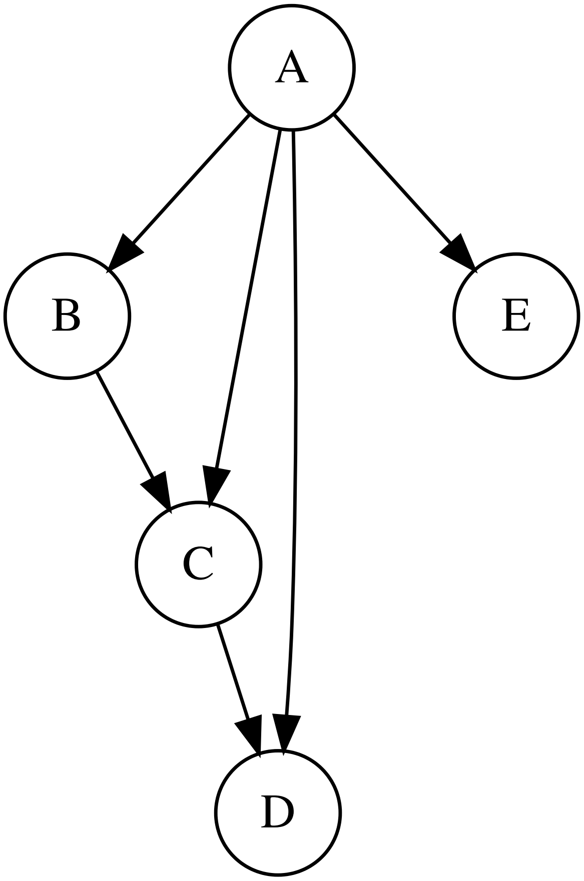
○ [4,3,2,6,1,5]

○ [1,2,5,3,6,4]

Question 15

1 pts

Given the following graph, which of the following statement is true?



○ The graph is cyclic and weakly connected.

○ The graph is acyclic and strongly connected.

○ [✓ The graph is acyclic and weakly connected.]

○ The graph is cyclic and strongly connected.

Question 16

1 pts

Let T be an empty Binary Search Tree. Then we insert the numbers in the following order using the insertion algorithm we introduced in lectures without balancing the tree in between:

4, 7, 2, 1, 3, 6, 5

Which of the following nodes share the same immediate parent?

A. 2 and 3
B. 5 and 6

C. 1 and 3
D. 2 and 5
E. 3 and 6
F. 2 and 7

○ A and B

○ B, C and F

○ C and F

○ D and E

Question 17

1 pts

What is the time complexity of searching for an element in a balanced BST?

○ O(N log N)

○ O(log N)

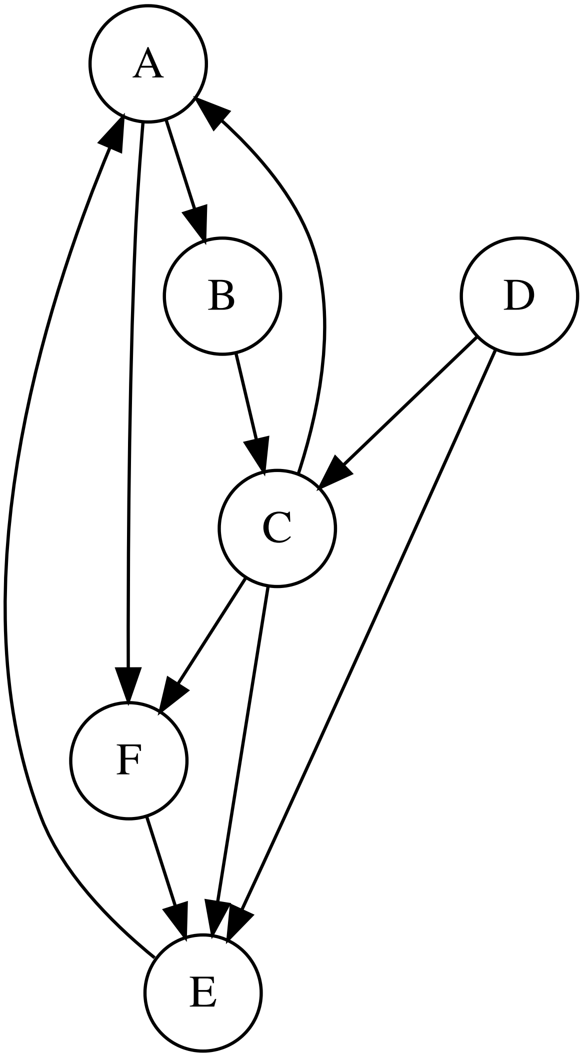
○ O(N**2)

○ O(N)

Question 18

1 pts

Given the following graph (both BFS and DFS questions have the same graph), what will the visiting order if we run **BFS** starting from node C to node B? Assume that for every node its children are alphabetically ordered.



○ C, A, E, F, B, D

○ C, A, E, F, B

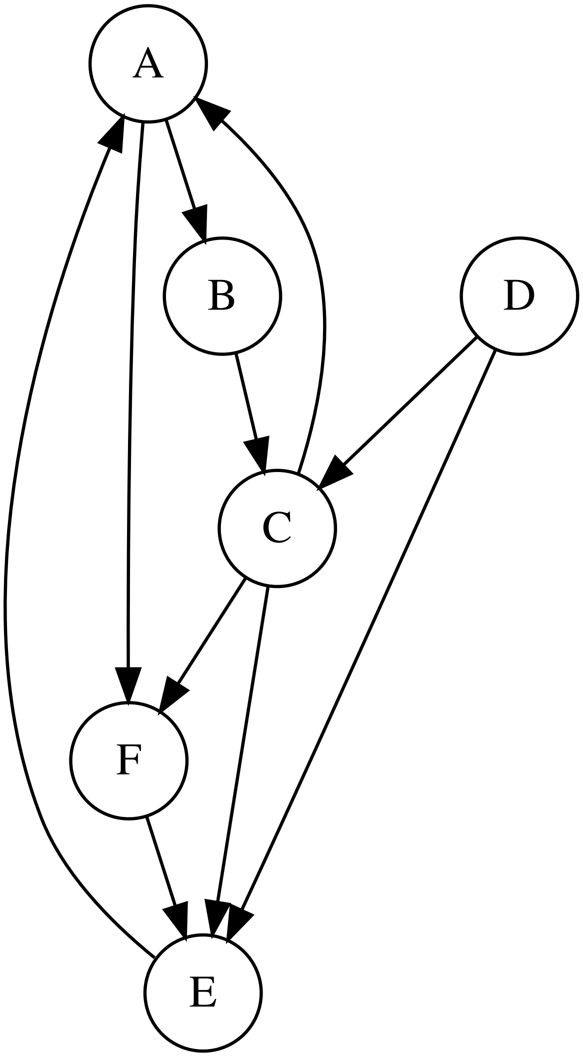
○ C, A, B

○ C, E, A, F, B

Question 19

1 pts

Given the following graph (both BFS and DFS questions have the same graph), what will the visiting order if we run **DFS** starting from node C to node E? Assume that for every node its children are alphabetically ordered.



○ C, A, B, E, F, D

○ C, A, E

○ C, A, B, E

○ C, A, B, F, E

Question 20

1 pts

```
from collections import deque
import heapq

heap = [-57, 94, 84, -100, 85, 43]
heapq.heapify(heap)
queue = deque()

while heap:
    item = heapq.heappop(heap)
    queue.appendleft(item)
```

What is `queue` after running the above code snippet?

○ deque([94, 85, 84, 43, -57, -100])

○ deque([-100, -57, 43, 84, 85, 94])

○ deque([-100, -57, 43, 94, 85, 84])

○ deque([-100, -57, 84, 43, 85, 94])

Quiz saved at 8:44pm

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