# **Final exam**

Started: Dec 8 at 7:14am

## **Quiz Instructions**

Welcome to CS152 section 5 final exam for fall 2022 semester. The final is completely online to be taken any time during 12/8/22. Submit by the end of the day, 11:59pm California time. No late submissions will be accepted. Use any resources available to you (computer, lecture slides, lecture videos, quiz reviews, search engines). Good luck!

Question 1	1 pts
Functional programming is characterized by	
Message passing between objects	
Function calls with local scope operations	
Knowledge base for the rules and the facts in the program	
O Divide and conquer approach	

Question 2	1 pts
Select all the hallmarks of functional programming	
Rules	
☐ Objects	
List comprehension	
✓ Referential transparancy	
✓ Pure functions	
✓ Lazy evaluation	

☐ Predicates	
First-class functions	
☐ Functions as units of execution	
✓ Recursion	
✓ Higher-order functions	

Question 3	1 pts
You have a function that performs a calculation and returns the result to the user part of its computation, it also prints out some information to the user on the screen ls this function pure?	
○ Yes	
<ul><li>No</li></ul>	

Question 4	1 pts
Can a pure function depend on a global variable?	
○ Yes	
<ul><li>No</li></ul>	

Question 5 1 pts

You wrote a function that will perform some computation and return the result as a return value. In your program you make a call to this function several times over the course of the application execution. Each time you use the same input parameter

values. The function executes and returns different values for each execute because the values of an outer scope variable it depends on changes over of the application execution. Is your function pure?	
○ Yes	
<ul><li>No</li></ul>	
Question 6	1 pts
	ı pıs
Same scenario as in question 5 (previous question). Is your function references transparent?	rentially
○ Yes	
<ul><li>No</li></ul>	
Question 7	1 pts
Impure functions are always an artifact of bad/erroneous programming pr	ractices.
○ True	
<ul><li>False</li></ul>	
Question 8	1 pts
A base case in recursion is optional and will not be present in every recursolution.	rsive

False

**Question 10** 

Tail recursion

Non-tail recursion

Question 9	1 pts
Which is more efficient?	
○ Non-tail recursion	
Tail recursion	

The following is a Python code for printing Fibonacci series. This solutions utilized recursion. Identify if this is tail recursion or non-tail recursion.

def fibonacci\_series(x):
 if x <= 1: # base condition
 return x
 else:
 return(fibonacci\_series(x-1) + fibonacci\_series(x-2))

Question 11

Is the following function referentially transparent?

def addTwo(a, b):

return a + b

1 pts

Yes			
○ No			

Question 12	1 pts
Is the following function pure?	
def computeAddition(a, b, c):	
result = a + b + c	
print("The result of the computation is: "+str(result)	
return result	
○ Yes	
<ul><li>No</li></ul>	

Question 13	1 pts
Which functions are treated as values?	
O Pure functions	
○ Impure functions	
<ul><li>First-class functions</li></ul>	
○ Higher-order functions	
Referentially transparent functions	

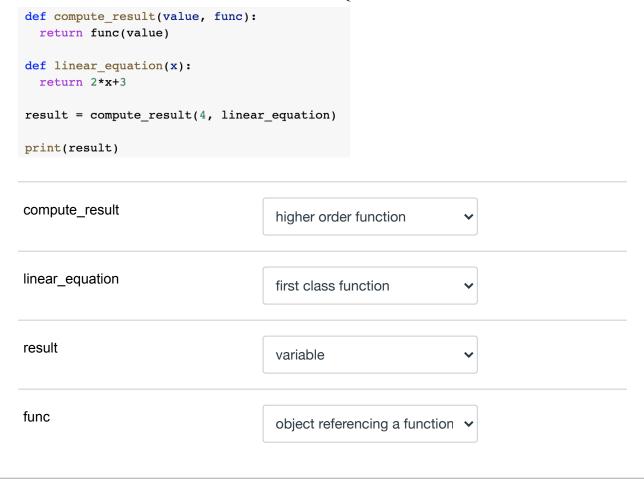
Question 14 1 pts

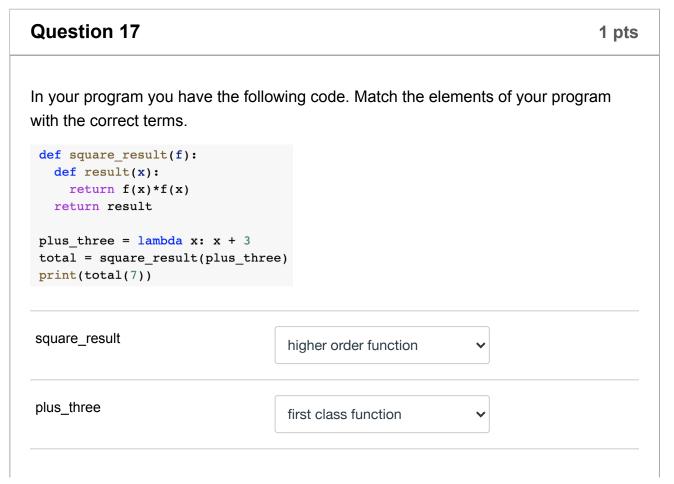
func	our code you are passing in a function as an input parameter into another stion. What kind of function is the function you are passing in as an input ameter?
$\bigcirc$ I	Referentially transparent function
O I	mpure function
O I	Pure function
O I	Higher-order function
<ul><li>I</li></ul>	First-class function

Question 15	1 pts
In your code you have a function, which returns another function as its return What kind of function is this function? (the question is about the function that not the one being returned)	
O Pure function	
○ First-class function	
Higher-order function	
Referentially transparent function	
○ Impure function	

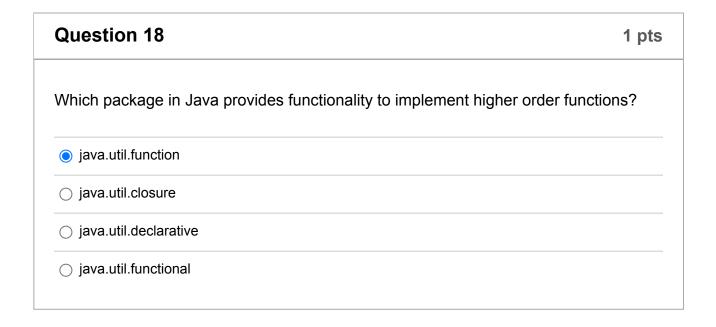
Question 16 1 pts

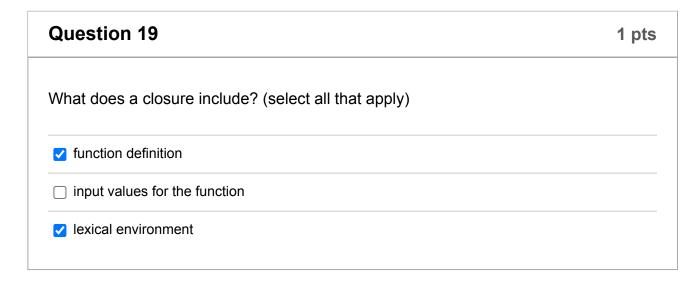
In your program you have the following code. Match the elements of your program with the correct terms.











Question 20

1 pts

What is the result the following Python code will produce?

myfunc = lambda x: list(range(x))
[ele for ele in reversed([myfunc(e) for e in range(5)])]

 [[0, 1, 2, 3, 4], [0, 1, 2, 3], [0, 1, 2], [0, 1]]

 [[], [0], [0, 1], [0, 1, 2], [0, 1, 2, 3]]

 [[0, 1, 2, 3], [0, 1, 2], [0, 1], [0], []]

 [[], [0], [0, 1], [0, 1, 2, 3], [0, 1, 2, 3, 4]]

 [[0, 1, 2, 3, 4], [0, 1, 2, 3], [0, 1, 2], [0, 1], [0]]

 [[0, 1, 2, 3, 4], [0, 1, 2, 3], [0, 1, 2], [0, 1], [0], []]

Closures provide performance benefits in interpreted programming.

True

False

What are the lambda functions?

Inner functions that can be returned as objects from higher order functions

Anonymous functions

Pure functions

Functions that do not return a return value

The only functions we can use with closures

Question 23	1 pts
Dataflow languages are conceptualized around what flowing through sequence operations?	of
○ Closures	
○ Variables	
<ul><li>Data</li></ul>	
Other operations	
○ Functions	

Question 24	1 pts
How do dataflow programming languages perform computations?	
<ul><li>Using operation graphs</li></ul>	
○ Using first-class functions	
○ Using data units	
○ Using SQL	

Question 25 1 pts

Your program follows a reactive framework. In your program you have the following instructions.

b = 10

c = 5

a = b + c	
d = a / 2	
e = a + d	
f = 3	
g = e + f - 1	
These lines of code alread	y executed and later on in your program the value of <b>c</b> gets
changed to 8. What is the	
changed to 8. What is the	
changed to 8. What is the	

Question 26	1 pts
Which system is responsible for managing everything about a database?	
○ SQL	
○ Structured data	
○ Persistant storage	
<ul><li>DBMS</li></ul>	
○ Storage area	

Question 27 1 pts

Can your JavaScript code access a database directly using an appropriate library?

<ul><li>No</li></ul>			
○ Yes			

Question 28	1 pts
Which SQL command would you use to view records in your database table?	
○ PRINT	
○ INSERT	
○ VIEW	
<ul><li>SELECT</li></ul>	
○ DISPLAY	
○ EXTRACT	
○ VIEW  ② SELECT  ○ DISPLAY	

Question 29	1 pts
Anonymous classes in Java are equivalent to anonymous functions in other programming languages.	
○ True	
<ul><li>False</li></ul>	

Question 30 1 pts

Every list comprehension can be rewritten with loops and every loop can be rewritten with list comprehension.

○ True			
<ul><li>False</li></ul>			

Question 31	1 pts
Which code is syntactically correct?	
○ lambda x, y, z: (x + y) / z	
○ def lambda x, y, z: (x + y) / z	
○ lambda x, y, z: return (x + y) / z	

## Question 32 1 pts

You are given these two versions of a recursive solution to cumulative sum problem. Is one of them a tail recursive solution?

#### Code A:

```
function recsum(x) {
   if (x === 0) {
      return 0;
   } else {
      return x + recsum(x - 1);
   }
}
```

### Code B:

```
function recsum(x, running_total = 0) {
   if (x === 0) {
      return running_total;
   } else {
      return recsum(x - 1, running_total + x);
   }
}
```

- O Both code A and B are tail recursive solutions
- Code B is tail recursive
- Ocde A is tail recursive
- O Neither A nor B is a tail recursive solution

Question 33 gts

Utilize map() **Python** function to implement a mapping for a list of integers to produce a new list in which each element is the result of the following functions for each corresponding element in the original list:

$$f(x) = 4x^2 + 3x - 5$$

### Example of your code execution:

```
original_list = range(10)
```

new\_list = list( map( mapping of the original list to the function above ) )

print(new\_list)

Edit View Insert Format Tools Table

```
original_list = range(10)

new_list = list(map(lambda x: 4*x**2 + 3*x -5, original_list))

print(new_list)
```

Question 34 5 pts

Implement a function called **adder()** in **Python**. This function should be a higher order function that returns a function object, which takes in a single value and adds to it a value that the outer function accepts. Create a closure called **add\_five** for the adder() function, with an input parameter value set to **5**. Create a different closure called **add\_ten** for the adder() function, with an input parameter value set to **10**. Now create a function called **invoke\_closure()**, which accepts two parameters: a list of integers, and a closure which to apply to each element of the list. Call this function twice, once using add\_five and once using add\_ten closure. Each time use the same list of integers generated by range(10). Your final two lines of code should look like this:

print(invoke\_closure(add\_five, list(range(10))))
print(invoke\_closure(add\_ten, list(range(10))))

The output of the above two lines of code should be the following:

[5, 6, 7, 8, 9, 10, 11, 12, 13, 14] [10, 11, 12, 13, 14, 15, 16, 17, 18, 19]

Edit View Insert Format Tools Table

12pt  $\vee$  Paragraph  $\vee$  B I  $\underline{\cup}$   $\underline{\wedge}$   $\vee$   $\underline{\vee}$   $\vee$   $\top^2$   $\vee$  :

add\_five = adder(5)

```
add_ten = adder(10)

def invoke_closure(function, list_):
    return list(map(function, list_))

print(invoke_closure(add_five, list(range(10))))

print(invoke_closure(add_ten, list(range(10))))
```

Question 35	1 pts
Is the following code valid in <b>JavaScript</b> ?	
let a = "Some text"	
let a = 14	
○ Yes	
No	

Question 37 5 pts

You are programming in **JavaScript**. In your program you have student objects with the following attributes:

- name (string)
- id (numeric)
- gpa (numeric)

Example: {name: "Jim Smith", id: 101, gpa: 3.7}

Write a function **called sort\_students()**, which accepts an array of student objects and sorts that array based on the specified field, sorts the array of objects accordingly, and returns the sorted array. For example:

```
const students = [...];
students_sorted_by_name = called sort_students(students, "name")
students_sorted_by_gpa = called sort_students(students, "gpa")
students_sorted_by_id = called sort_students(students, "id")
```

```
if(field === "name"){

return students.sort(function(a, b){ return b.name - a.name});
}else if(field === "gpa"){

return students.sort(function(a, b){ return b.gpa - a.gpa});
} else if(field === "id"){

return students.sort(function(a, b){ return b.id - a.id});
}

p

if(field === "name"){

return students.sort(function(a, b){ return b.gpa - a.gpa});
}

42 words
```

Question 38 5 pts

In JavaScript, define a class called Person. Each person has the following attributes:

- name
- age

The class **Person** should have the following functionality:

- constructor that initializes all the attributes
- method print\_info() which prints out information about the person

Define a class called **Artist**, which inherits from class **Person**. Each artist should have the following attribute:

specialty

The class Artist should have the following functionality:

- constructor that initializes all the attributes (and delegates to the parent as needed)
- method artist\_bio(), which prints out all the information about the artist (name, age, specialty)

Add code that creates an array of artist instances (attribute values are up to you).

Iterate over the array of artists and invoke artist\_bio() method on each instance.

```
this.specialty=specialty;
}
artist_info = () => {
    return this.name + " " + this.age+" "+this.specialty;
}
}
const artists = [new Artist ("Test Artist 1", 21,"singing"), new Artist ("Test Artist 2", 29 , "singing"), new Artist ("Test Artist 3", 22 , "dancing")]
artists.forEach(artist => console.log(artist.artist_info()));
```

р



**★ (\*)** 67 words </> **(\*) (\*)** 

Question 39 4 pts

Implement **Scheme** code that applies mapping of the following function to each element of the specified list:

$$f(x) = 2x^3 - 5x + 1$$

Apply this mapping to the following list: 5, 6, 2, 9, 2, 8

Apply display() function to print the results of the mapping operation.

(display (map (lambda(x)(+ (- (\* 2 ( expt x 3)) (\* x 5)) 1)) '(5 6 2 9 2 8) ))

р

**Question 40** 

3 pts

In **Scheme** define a function called **compute\_product()**, which accepts two input parameters and multiplies them by each other. **Print/display** the result of applying this function to values **3** and **5**.

```
(define (compute_product a b)
        (display (* a b))
)
(compute_product 3 5)
(newline)
```

р



**★** 11 words | </> ✓ #



Quiz saved at 8:17am

Submit Quiz