Started on	Tuesday, 28 February 2023, 22:50
State	Finished
Completed on	Thursday, 9 March 2023, 20:01
Time taken	8 days 21 hours
Grade	**150.00** out of 150.00 (**100**%)

Question **1**

Correct

Mark 10.00 out of 10.00

In the buggy Java code below, is the bug caught by static checking, dynamic checking, or not at all?

```
1.  int n = 5;
2.  if (n) {
3.      System.out.println("n is " + n);
4.  }
```

Select one:

- a. static checking ✔
- b. dynamic checking
- c. no checking, resulting in wrong answer

Your answer is correct.

The correct answer is: static checking

Question **2**

Correct

Mark 10.00 out of 10.00

In the buggy Java code below, is the bug caught by static checking, dynamic checking, or not at all?

```
1.  int bigNum = 200000;        // bigNum is 200,000
2.  bigNum = bigNum * bigNum;   // bigNum should be 40 billion
```

Select one:

- a. static checking
- b. dynamic checking
- c. no checking, resulting in wrong answer ✔

Your answer is correct.

The correct answer is: no checking, resulting in wrong answer

Question **3**

Correct

Mark 10.00 out of 10.00

In the buggy Java code below, is the bug caught by static checking, dynamic checking, or not at all?

```
1.  // the probability of an event is prob = 1/5 = 0.2
2.  double prob = 1/5;
```

Select one:

- a. static checking
- b. dynamic checking
- c. no checking, resulting in wrong answer ✔

Your answer is correct.

The correct answer is: no checking, resulting in wrong answer

Question **4**

Correct

Mark 10.00 out of 10.00

In the buggy Java code below, is the bug caught by static checking, dynamic checking, or not at all?

```
1.  int sum = 0;
2.  int n = 0;
3.  int average = sum/n;
```

Select one:

- a. static checking
- b. dynamic checking ✔
- c. no checking, resulting in wrong answer

Your answer is correct.

The correct answer is: dynamic checking

Question **5**

Correct

Mark 10.00 out of 10.00

In the buggy Java code below, is the bug caught by static checking, dynamic checking, or not at all?

```
1.  double sum = 7;
2.  double n = 0;
3.  double average = sum/n;
```

→ Infinity ⊆ Special values: NaN, POSITIVE_INFINITY, NEGATIVE_INFINITY.

Select one:

- a. static checking
- b. dynamic checking
- c. no checking, resulting in wrong answer ✔

< Special values in floating-point types. >

Your answer is correct.

The correct answer is: no checking, resulting in wrong answer

Question **6**

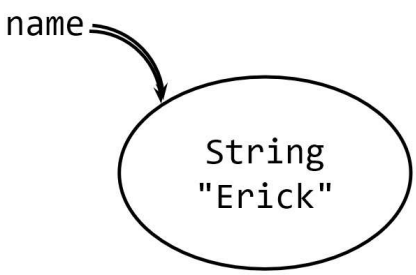
Correct

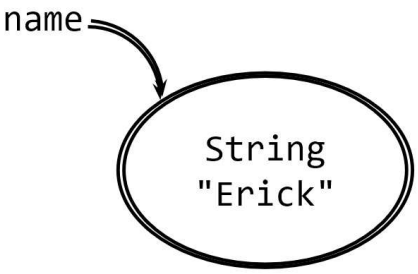
Mark 10.00 out of 10.00

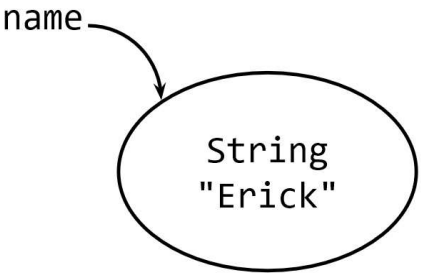
Which is the correct snapshot diagram for:

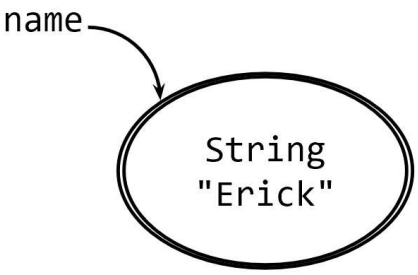
final String name = "Erick";

Select one:



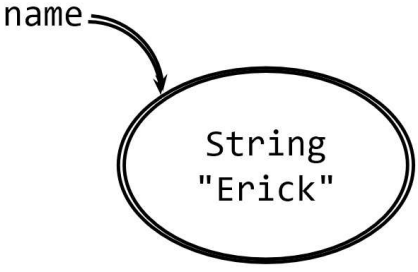






Your answer is correct.

The correct answer is:



Question **7**

Correct

Mark 10.00 out of 10.00

Choose the **incorrect** statement:

Select one:

- a. String is an immutable type.
- b. StringBuilder is a mutable type.
- c. final variable cannot be reassigned.
- d. object pointed by final variable cannot be mutated. ✔
- e. List is a mutable type.

Your answer is correct.

The correct answer is: object pointed by final variable cannot be mutated.

Question **8**

Correct

Mark 20.00 out of 20.00

When you try to reassign a final variable, Java compiler will produce a compile error.

Therefore, final provides you

static checking ✔ for immutable references ✔ .

Question **9**

Correct

Mark 10.00 out of 10.00

Rewrite the variable declaration below using Lists instead of arrays:

```
1. char[][] matrix;
```

Answer: List<List<Character>> matrix = new ArrayList<>(); ✔

The correct answer is: List<List<Character>> matrix ;

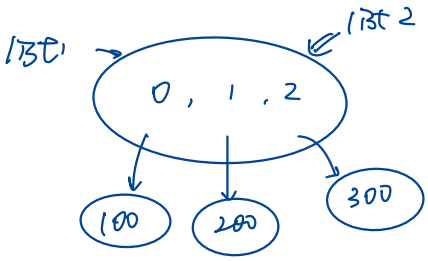
Question **10**

Correct

Mark 10.00 out of 10.00

Given a code:

```
List<Integer> list1 = new ArrayList<>();
list1.add(100);
list1.add(200);
final List<Integer> list2 = list1;
list1.add(300);
```



If we add a line of code below:

```
list2 = list1;
```

choose the **correct** statement:

Select one:

- a. there will be an error, detected by static checking. ✔ → "final"
- b. there will be an error, detected by dynamic checking.
- c. there is no error.

Your answer is correct.

The correct answer is: there will be an error, detected by static checking.

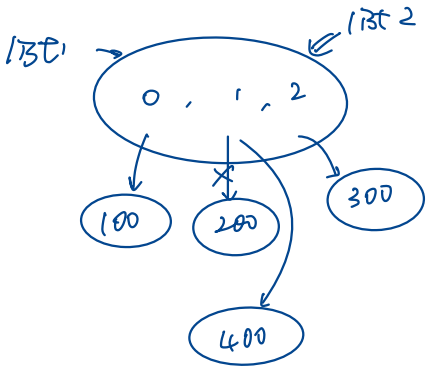
Question **11**

Correct

Mark 10.00 out of 10.00

Given a code:

```
List<Integer> list1 = new ArrayList<>();
list1.add(100);
list1.add(200);
final List<Integer> list2 = list1;
list1.add(300);
```



If we add a line of code below:

```
list1.set(1, 400);
```

choose the **correct** statement:

Select one:

- a. there will be an error, detected by static checking.
- b. there will be an error, detected by dynamic checking.
- c. there is no error. ✔

Your answer is correct.

The correct answer is: there is no error.

Question **12**

Correct

Mark 10.00 out of 10.00

Given a code:

```
List<Integer> list1 = new ArrayList<>();
list1.add(100);
list1.add(200);
final List<Integer> list2 = list1;
list1.add(300);
```

If we add a line of code below:

```
list2.set(1, 400);
```

choose the **correct** statement:

Select one:

- a. there will be an error, detected by static checking.
- b. there will be an error, detected by dynamic checking.
- c. there is no error. ✔

Your answer is correct.

The correct answer is: there is no error.

Question **13**

Correct

Mark 10.00 out of 10.00

Given a code:

```
List<Integer> list1 = new ArrayList<>();
list1.add(100);
list1.add(200);
final List<Integer> list2 = list1;
list1.add(300);
```

If we add a line of code below:

```
list2.set(3, 400);
```

choose the **correct** statement:

Select one:

- a. there will be an error, detected by static checking.
- b. there will be an error, detected by dynamic checking. ✔ (out-of-range index es)
- c. there is no error.

Your answer is correct.

The correct answer is: there will be an error, detected by dynamic checking.

Question **14**

Correct

Mark 10.00 out of 10.00

HashMap
Map<Integer, String> hostel = new HashMap<>();

Create a map named hostel with integer keys and string values, to store room number and tenant name pairs.

hostel.put(777, "Alice");

Then, add a key-value pair for a tenant named Alice in room number 777.

Select one:

- Map<Integer, String> hostel = new HashMap<>();
  hostel.add(777, "Alice");
- ✔ Map<Integer, String> hostel = new HashMap<>();
  hostel.put(777, "Alice");
- Map<String, Integer> hostel = new HashMap<>();
  hostel.add("Alice", 777);
- Map<String, Integer> hostel = new HashMap<>();
  hostel.put("Alice", 777);
- Map<String, int> hostel = new HashMap<>();
  hostel.add("Alice", 777);
- Map<String, int> hostel = new HashMap<>();
  hostel.put("Alice", 777);

Map × primitive type : boolean, byte, char, short, int, long, float, double (lowercase)

Map ✓ object type : String, BigInteger, List, Character, Integer... (Start with capital letter)

Your answer is correct.

The correct answer is:

Map<Integer, String> hostel = new HashMap<>();

hostel.put(777, "Alice");

◄ CPT204 2223 Lab 3 Video Recordings

Jump to...

Lab Exercise #3.1 Max Stretch ►

Started on	Friday, 17 March 2023, 02:05
State	Finished
Completed on	Friday, 17 March 2023, 02:24
Time taken	19 mins 1 sec
Grade	**70.00** out of 130.00 (**53.85**%)

Question **1**

Incorrect

Mark 0.00 out of 10.00

Somebody wrote a **bad** code that ***does not fail fast*** (from the Lecture 3):

```
1.  public static int dayOfYear(int month, int dayOfMonth, int year) {
2.      if (month == 2) {
3.          dayOfMonth += 31;
4.      } else if (month == 3) {
5.          dayOfMonth += 59;
6.      } else if (month == 4) {
7.          dayOfMonth += 90;
8.      } else if (month == 5) {
9.          dayOfMonth += 31 + 28 + 31 + 30;
10.     } else if (month == 6) {
11.         dayOfMonth += 31 + 28 + 31 + 30 + 31;
12.     } else if (month == 7) {
13.         dayOfMonth += 31 + 28 + 31 + 30 + 31 + 30;
14.     } else if (month == 8) {
15.         dayOfMonth += 31 + 28 + 31 + 30 + 31 + 30 + 31;
16.     } else if (month == 9) {
17.         dayOfMonth += 31 + 28 + 31 + 30 + 31 + 30 + 31 + 31;
18.     } else if (month == 10) {
19.         dayOfMonth += 31 + 28 + 31 + 30 + 31 + 30 + 31 + 31 + 30;
20.     } else if (month == 11) {
21.         dayOfMonth += 31 + 28 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 31;
22.     } else if (month == 12) {
23.         dayOfMonth += 31 + 28 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 31 + 31;
24.     }
25.     return dayOfMonth;
26. }
```

Assume today is **January 3, 2019**;
which means that the correct *dayOfYear* for this date is 3,
since it's the third day of the year.

Now **another programmer** calls that method with arguments as follows:

```
1.  dayOfYear(1, 3, 2019)
```

Choose the **correct** statement:

Select one:

- a. The programmer did not make a mistake.
  The method gave the right answer.
- b. The programmer made a mistake.
  The method gave the right answer, luckily.
- c. The programmer made a mistake.
  The method gave the wrong answer, quietly.
- d. The programmer made a mistake.
  The method detected a static error.
- e. The programmer made a mistake.
  The method detected a dynamic error.

Your answer is incorrect.

The correct answer is: The programmer did not make a mistake.
The method gave the right answer.

Question **2**

Incorrect

Mark 0.00 out of 10.00

Now **another programmer** calls that method with arguments as follows:

```
1.  dayOfYear(0, 3, 2019)
```

Choose the **correct** statement:

Select one:

- a. The programmer did not make a mistake.
  The method gave the right answer.
- b. The programmer made a mistake.
  The method gave the right answer, luckily.
- c. The programmer made a mistake.
  The method gave the wrong answer, quietly.
- d. The programmer made a mistake.
  The method detected a static error.
- e. The programmer made a mistake.
  The method detected a dynamic error.

Your answer is incorrect.

The correct answer is: The programmer made a mistake.
The method gave the right answer, luckily.

Question **3**

Incorrect

Mark 0.00 out of 10.00

Now **another programmer** calls that method with arguments as follows:

```
1.  dayOfYear(3, 1, 2019)
```

Choose the **correct** statement:

Select one:

- a. The programmer did not make a mistake.
  The method gave the right answer.
- b. The programmer made a mistake.
  The method gave the right answer, luckily.
- c. The programmer made a mistake.
  The method gave the wrong answer, quietly.
- d. The programmer made a mistake.
  The method detected a static error.
- e. The programmer made a mistake.
  The method detected a dynamic error.

Your answer is incorrect.

The correct answer is: The programmer made a mistake.
The method gave the wrong answer, quietly.

Question **4**

Correct

Mark 10.00 out of 10.00

Now **another programmer** calls that method with arguments as follows:

```
1.  dayOfYear("January", 3, 2019)
```

Choose the **correct** statement:

Select one:

- a. The programmer did not make a mistake.
  The method gave the right answer.
- b. The programmer made a mistake.
  The method gave the right answer, luckily.
- c. The programmer made a mistake.
  The method gave the wrong answer, quietly.
- d. The programmer made a mistake. ✔
  The method detected a static error.
- e. The programmer made a mistake.
  The method detected a dynamic error.

Your answer is correct.

The correct answer is: The programmer made a mistake.
The method detected a static error.

Question **5**

Correct

Mark 10.00 out of 10.00

Now **another programmer** calls that method with arguments as follows:

```
1.  dayOfYear(2019, 1, 3)
```

Choose the **correct** statement:

Select one:

- a. The programmer did not make a mistake.
  The method gave the right answer.
- b. The programmer made a mistake.
  The method gave the right answer, luckily.
- c. The programmer made a mistake. ✔
  The method gave the wrong answer, quietly.
- d. The programmer made a mistake.
  The method detected a static error.
- e. The programmer made a mistake.
  The method detected a dynamic error.

Your answer is correct.

The correct answer is: The programmer made a mistake.
The method gave the wrong answer, quietly.

Question **6**

Correct

Mark 10.00 out of 10.00

We should not use global variables.

Making a variable into a constant can eliminate the risk of global variables.

What keyword should be added to such global variables to make them constants ?

Answer: final ✔

The correct answer is: final

Question **7**

Incorrect

Mark 0.00 out of 10.00

In the 1990s, the Ariane 5 launch vehicle, designed and built for the European Space Agency, self-destructed 37 seconds after its first launch.

The reason was a control software bug that went undetected. The Ariane 5's guidance software was reused from the Ariane 4, which was a slower rocket. When the velocity calculation converted from a 64-bit floating point number (a double in Java terminology, though this software wasn't written in Java) to a 16-bit signed integer (a short), it overflowed the small integer and caused an exception to be thrown.

The exception handler had been disabled for efficiency reasons, so the guidance software crashed. Without guidance, the rocket crashed too. The cost of the failure was $1 billion.

What ideas does this story demonstrate?
Choose the **correct** option.

Select one:

- a. High-quality safety-critical software cannot have residual bugs. ✖
- b. Testing all possible inputs is the best solution to this problem.
- c. Static checking could have detected this bug.
- d. Software exhibits discontinuous behavior, unlike many physically-engineered systems. ✔

Your answer is incorrect.

The correct answer is: Software exhibits discontinuous behavior, unlike many physically-engineered systems.

Question **8**

Correct

Mark 10.00 out of 10.00

Consider the following specification:

```
1.  /**
2.   * Reverses the end of a string.
3.   *
4.   *                          012345                    012345
5.   * For example: reverseEnd("Hello, world", 5) returns "Hellodlrow ,"
6.   *                               <----->                  <----->
7.   *
8.   * With start == 0, reverses the entire text.
9.   * With start == text.length(), reverses nothing.
10.  *
11.  * @param text    non-null String that will have its end reversed
12.  * @param start   the index at which the remainder of the input is reversed,
13.  *                requires 0 <= start <= text.length()
14.  * @return input text with the substring from start to the end of the string reversed
15.  */
16. public static String reverseEnd(String text, int start)
```

Which of the following is the **best partitions** for the **start** parameter?

Select one:

- a. start = 0, 0 < start < text.length(), start = text.length() ✔
- b. start = 0, start = 5, start = 100
- c. start < 0, start = 0, start > 0
- d. start < text.length(), start = text.length(), start > text.length()

Your answer is correct.

The correct answer is: start = 0, 0 < start < text.length(), start = text.length()

partition on input "this":

- present state / visible to client
  e.g. whether the string is empty string
- how it has been created, produced, or modified up to that point.
  e.g. substring, reverse

↑ implementation on it

Partition rela → Specification

✗ → partition on rep values.

✓ → partition on input/output "this" ⇒ a test suite that exercise different states of the rep.

✓ → write white box tests to ensure coverage of particular rep states & the code that handles them

Question **9**

Incorrect

Mark 0.00 out of 10.00

Consider the following specification:

```
/**
 * Reverses the end of a string.
 *
 *                          012345                    012345
 * For example: reverseEnd("Hello, world", 5) returns "Hellodlrow ,"
 *                               <----->                  <----->
 *
 * With start == 0, reverses the entire text.
 * With start == text.length(), reverses nothing.
 *
 * @param text    non-null String that will have its end reversed
 * @param start   the index at which the remainder of the input is reversed,
 *                requires 0 <= start <= text.length()
 * @return input text with the substring from start to the end of the string reversed
 */
public static String reverseEnd(String text, int start)
```

Which of the following is the **best partitions** for the **text** parameter?

Select one:

- a. text.length() = 0; text.length()-start is odd; text.length()-start is even
- b. text contains some letters; text contains no letters, but some numbers; text contains neither letters nor numbers ✖
- c. text.length() < 0; text.length() = 0; text.length() > 0
- d. text is every possible string from length 0 to 100

Your answer is incorrect.

The correct answer is: text.length() = 0; text.length()-start is odd; text.length()-start is even

Question **10**

Incorrect

Mark 0.00 out of 10.00

Select the **incorrect** statement about Covering the Partitions:

Select one:

- a. For the BigInteger `multiply` example, using cover each part approach, we can choose 5 test cases.
- b. The full cartesian approach may not be the best because it could produce too many and redundant test cases. ✖
- c. The cover each part approach may not be the best because the function may behave differently for a certain combination of inputs.
- d. For the `max` example, using full Cartesian approach, we can choose less than 75 test cases because not all combinations are possible.

Your answer is incorrect.

The correct answer is: For the BigInteger `multiply` example, using cover each part approach, we can choose 5 test cases.

Question **11**

Correct

Mark 10.00 out of 10.00

In designing the test suite for the Recursive Reverse String problem,
we include the empty string as a test case.

Which testing principle do we use?

Select one:

- a. Choose the boundaries in the partition. ✔
- b. Divide the input space into subdomains.
- c. Choose one test case from each subdomain.
- d. Choose one test case from every legal combination of the partition.

Your answer is correct.

The correct answer is: Choose the boundaries in the partition.

Question **12**

Correct

Mark 10.00 out of 10.00

When you write the recursive step of your recursive method,
which part of your code that must be reached by it ?

Answer: base case ✔

The correct answer is: the base case

Question **13**

Correct

Mark 10.00 out of 10.00

In solving a problem recursively, you can define a/an

helper method

✔ that uses an arbitrary number of parameters.

◄ CPT204 2223 Lab 4 Video Recordings

Jump to...

Lab Exercise #4.1 Check Substring ►

Started on	Friday, 24 March 2023, 00:58
State	Finished
Completed on	Friday, 24 March 2023, 01:06
Time taken	8 mins 20 secs
Grade	**66.67** out of 110.00 (**60.61**%)

Question **1**

Correct

Mark 10.00 out of 10.00

Using your favorite code coverage tool, you add test cases one-by-one, until all reachable statements in your code have been executed at least once.

Which coverage guarantee your code has now?

Select one:

- a. Statement coverage ✔
- b. Branch coverage
- c. Path coverage
- d. Unit coverage

Your answer is correct.

The correct answer is: Statement coverage

Question **2**

Correct

Mark 10.00 out of 10.00

Consider the following method:

```
1.  /**
2.   * Sort a list of integers in nondecreasing order.  Modifies the list so that
3.   * values.get(i) <= values.get(i+1) for all 0<=i<values.length()-1
4.   */
5.  public static void sort(List<Integer> values) {
6.      // choose a good algorithm for the size of the list
7.      if (values.length() < 10) {
8.          radixSort(values);
9.      } else if (values.length() < 1000*1000*1000) {
10.         quickSort(values);
11.     } else {
12.         mergeSort(values);
13.     }
14. }
```

Which test case of the following test cases are likely to be **a boundary value** produced by **white box testing**?

Select one:

- a. [9, 8, 7, 6, 5, 4, 3, 2, 1, 0] ✔
- b. the empty list
- c. [0, 0, 1, 0, 0, 0, 0]
- d. [1, 2, 3]

Your answer is correct.

The correct answer is: [9, 8, 7, 6, 5, 4, 3, 2, 1, 0]

Question **3**

Correct

Mark 10.00 out of 10.00

After fixing a bug that caused test case X fail,

you need to rerun all your JUnit tests, not just test case X.

Select one:

- True ✔
- False

The correct answer is 'True'.

Question **4**

Correct

Mark 10.00 out of 10.00

Which one of these testing activities follows the principle of ***regression testing***?

Select one:

- a. Changes should be tested against all inputs that induced bugs in earlier versions of the code
- b. Every component in your code should have an associated set of tests that exercises all the corner cases in its specification
- c. Tests should be written before you write the code as a way of checking your understanding of the specification
- d. When a new test exposes a bug, you should run it on all previous versions of the code until you find the version where the bug was introduced

Your answer is correct.

The correct answer is: Changes should be tested against all inputs that induced bugs in earlier versions of the code

Question **5**

Partially correct

Mark 6.67 out of 20.00

Which of these techniques are useful for choosing test cases in test-first programming, ***before*** any code is written?

Select one or more:

- [x] Partitioning
- [x] Boundaries
- [x] Black box
- [ ] Regression
- [ ] Coverage
- [ ] White box
- [ ] Integration

Your answer is partially correct.

You have selected too many options.

The correct answers are: Partitioning, Boundaries, Black box

Question **6**

Correct

Mark 10.00 out of 10.00

Choose the **correct** statement about a regression test case.

Select one:

- a. A regression test case comes from the discovery of a bug ✔
- b. A regression test case is chosen from the partitions
- c. A regression test case can come out of black-box testing
- d. A regression test case can come out of white-box testing

Your answer is correct.

The correct answer is: A regression test case comes from the discovery of a bug

Question **7**

Incorrect

Mark 0.00 out of 10.00

As a temporary substitute for a method that is not yet to be developed, you write a code to simulate the method's functionality. The method can then be called by another method that you want to test.

Such method is called a/an

mock object ✖

stub

→ { method/module : stub
  class : mock object

Question **8**

Incorrect

Mark 0.00 out of 10.00

Which button to click to get the Java Visualizer run the next line of your code and show the subsequent visualization?

Select one:

- a. Step Into ✔
- b. Step Over ✖
- c. Step Out
- d. Step Off
- e. Step On

— (Force) 可进入官方方法 (即任何方法)
— execute line-by-line, 若有方法调用, 则逐行进入 (仅限文方法)
— 向下执行一行, 若有方法调用则将该方法执行完毕返回
— 跳出方法, 返回方法被调用的下一行语句

Your answer is incorrect.

The correct answer is: Step Into

Question **9**

Incorrect

Mark 0.00 out of 10.00

Write one line of Java code that *declares* a MyList pointer named **p** and *initializes* it to the current MyList object.

Do not forget to end it with a semicolon.

Answer: MyList p = list;

The correct answer is: MyList p = this;

Question **10**

Correct

Mark 10.00 out of 10.00

What is the println result of :

```
1.  MyList3 list = new MyList3(100, null);
2.  list = new MyList3(200, list);
3.  list = new MyList3(300, list);
4.
5.  System.out.println(list.get(0));
```

Answer: 300

The correct answer is: 300

◄ CPT204 2223 Lab 5 Video Recordings

Jump to...

Lab Exercise #5.1 MyList Iterative Square Mutate ►

Started on	Thursday, 30 March 2023, 21:09
State	Finished
Completed on	Thursday, 30 March 2023, 21:22
Time taken	12 mins 45 secs
Grade	**100.00** out of 110.00 (**90.91**%)

Question **1**

Correct

Mark 10.00 out of 10.00

Consider the two methods to find the value `val` in an integer array `a` below.

```
1.  static int findFirst(int[] a, int val) {
2.      for (int i = 0; i < a.length; i++) {
3.          if (a[i] == val) return i;
4.      }
5.      return a.length;
6.  }
```

```
1.  static int findLast(int[] a, int val) {
2.      for (int i = a.length -1 ; i >= 0; i--) {
3.          if (a[i] == val) return i;
4.      }
5.      return -1;
6.  }
```

If clients only care about calling the find method when they know that `val` *always occurs exactly once* in `a`, `findFirst` and `findLast` are behaviorally equivalent.

Select one:

- True ✔
- False

The correct answer is 'True'.

Question **2**

Incorrect

Mark 0.00 out of 10.00

Consider the two methods to find the value `val` in an integer array `a` below.

```
1.  static int findFirst(int[] a, int val) {
2.      for (int i = 0; i < a.length; i++) {
3.          if (a[i] == val) return i;
4.      }
5.      return a.length;
6.  }
```

```
1.  static int findLast(int[] a, int val) {
2.      for (int i = a.length -1 ; i >= 0; i--) {
3.          if (a[i] == val) return i;
4.      }
5.      return -1;
6.  }
```

If clients only care that the find method should return any index `i` such that `a[i] == val`, if `val` is in `a`;

and any integer `j` where `j` is ***not*** a valid index of array `a`, otherwise;

then `findFirst` and `findLast` are behaviorally equivalent.

Select one:

- True
- False ✖

The correct answer is 'True'.

Question **3**

Correct

Mark 10.00 out of 10.00

Suppose we're working on the method below:

```
1.  /**
2.   * Requires: tiles has length 7 & contains only uppercase letters.
3.   *           crossings contains only uppercase letters, without duplicates.
4.   * Effects: Returns a list of words where each word can be made by taking
5.   *          letters from tiles and at most 1 letter from crossings.
6.   */
7.  public static List<String> scrabble(String tiles, String crossings) {
8.      if (tiles.length() != 7) { throw new RuntimeException(); }
9.      return new ArrayList<>();
10. }
```

Which one is a part of the *postcondition* of `scrabble`?

Select one:

- a. scrabble returns a list of strings ✔
- b. tiles has only uppercase letters
- c. crossings has no duplicates
- d. scrabble takes two arguments

Your answer is correct.

The correct answer is: scrabble returns a list of strings

Question **4**

Correct

Mark 10.00 out of 10.00

Suppose we're working on the method below:

```
1.  /**
2.   * Requires: tiles has length 7 & contains only uppercase letters.
3.   *           crossings contains only uppercase letters, without duplicates.
4.   * Effects: Returns a list of words where each word can be made by taking
5.   *          letters from tiles and at most 1 letter from crossings.
6.   */
7.  public static List<String> scrabble(String tiles, String crossings) {
8.      if (tiles.length() != 7) { throw new RuntimeException(); }
9.      return new ArrayList<>();
10. }
```

Which one is **not** a part of the *precondition* of `scrabble`?

Select one:

- a. scrabble returns an empty ArrayList ✔
- b. tiles has length 7
- c. crossings is a string of uppercase letters
- d. scrabble's arguments are of type String and String

Your answer is correct.

The correct answer is: scrabble returns an empty ArrayList

Question **5**

Correct

Mark 10.00 out of 10.00

Suppose we're working on the method below:

```
1.  /**
2.   * Requires: tiles has length 7 & contains only uppercase letters.
3.   *           crossings contains only uppercase letters, without duplicates.
4.   * Effects: Returns a list of words where each word can be made by taking
5.   *          letters from tiles and at most 1 letter from crossings.
6.   */
7.  public static List<String> scrabble(String tiles, String crossings) {
8.      if (tiles.length() != 7) { throw new RuntimeException(); }
9.      return new ArrayList<>();
10. }
```

Which one is the part of the spec that are ***checked statically*** by Java?

Select one:

- a. scrabble takes two arguments ✔
- b. tiles is a string of uppercase letters ✗ no
- c. crossings has no duplicates ✗ no
- d. when tiles.length() != 7, scrabble throws a RuntimeException ✗ dynamic

Your answer is correct.

The correct answer is: scrabble takes two arguments

Question **6**

Correct

Mark 10.00 out of 10.00

Which of the following is **not** part of a method's specification?

Select one:

- a. restrictions on used data types ✔
- b. return type
- c. restrictions on return values
- d. number of arguments
- e. argument types
- f. restrictions on argument values

Your answer is correct.

The correct answer is: restrictions on used data types

Question **7**

Correct

Mark 10.00 out of 10.00

Alice writes the following code:

```
1.  public static int gcd(int a, int b) {
2.      if (a > b) {
3.          return gcd(a-b, b);
4.      } else if (b > a) {
5.          return gcd(a, b-a);
6.      }
7.      return a;
8.  }
```

Bob writes the following test:

```
1.  @Test public void gcdTest() {
2.      assertEquals(6, gcd(24, 54));
3.  }
```

Which of the following statement is **incorrect** ?

Select one:

- a. If Alice adds $a > 0$ to the precondition, Bob should test negative values of a ✔
- b. If Alice does not add $a > 0$ to the precondition, Bob should test negative values of a
- c. Alice should write $a > 0,\ b > 0$ in the precondition of gcd
- d. Alice should not write $a \text{ and } b \text{ are integers}$ in the precondition of gcd

Your answer is correct.

The correct answer is: If Alice adds $a > 0$ to the precondition, Bob should test negative values of a

Question **8**

Correct

Mark 20.00 out of 20.00

Given the following specification :

```
1.  static int find(int[] arr, int val)
2.      requires: arr[0] == val
3.      effects:  returns index i such that arr[i] == val
```

Which are the valid test cases for `find` ?

Select one or more:

- [x] `find([ 1, 2, 3 ], 1)` must return 0 ✔
- [ ] `find([ 4, 4, 5 ], 4)` must return 0
- [ ] `find([ 4, 4, 5 ], 4)` must return 1
- [ ] `find([ 6, 7, 8 ], 2)` throws an exception
- [x] `find([ 3 ], 3)` must return 0 ✔
- [ ] `find([ 4 ], 5)` must not return 0

Your answer is correct.

The correct answers are: `find([ 1, 2, 3 ], 1)` must return 0, `find([ 3 ], 3)` must return 0

Question **9**

Correct

Mark 10.00 out of 10.00

What is a condition that must be preserved and guaranteed to be true during a method's execution called ?

Answer: invariant ✔

The correct answer is: invariant

Question **10**

Correct

Mark 10.00 out of 10.00

To allow types such as Integer, String, and user-defined types to be a parameter to methods, classes, and interfaces, we use

generics ✔ .

Using it, we can create classes that work with different data types.

◄ CPT204 2223 Lab 6 Video Recording

Jump to...

Lab Exercise #6.1 LLDeque EMPTY CONSTRUCTOR ►

Started on	Thursday, 6 April 2023, 13:34
State	Finished
Completed on	Thursday, 13 April 2023, 20:28
Time taken	7 days 6 hours
Grade	**75.00** out of 130.00 (**57.69**%)

Question **1**

Partially correct

Mark 15.00 out of 20.00

Which of the following **cannot** be null?

primitives → static error
non-primitives → dynamic error

Select one or more:

- [x] char c; ✔
- [ ] static final String str;
- [ ] int[] arr;
- [x] Double d; ✖ → Reference/object type
- [ ] final BackAccount myBankAccount;
- [ ] String name;
- [x] double d; ✔

Your answer is partially correct.

You have selected too many options.
The correct answers are: char c;,
double d;

Question **2**

Incorrect

Mark 0.00 out of 10.00

Given the following code :

```
1.  public static String nope() {
2.      return null;            // (1)
3.  }
4.
5.  public static void main(String[] args) {
6.      String a = nope();      // (2)
7.      String b = null;        // (3)
8.      if (a.length() > 0) {   // (4)
9.          b = a;              // (5)
10.     }
11.     return b;               // (6)
12. }
```

Which line contains a static error ?

Select one:

- (1)
- (2)
- (3) ✖
- (4)
- (5)
- (6)

Your answer is incorrect.

The correct answer is: (6)

Question **3**

Correct

Mark 10.00 out of 10.00

Given the same code from Question 2 above :

```
1.  public static String nope() {
2.      return null;            // (1)
3.  }
4.
5.  public static void main(String[] args) {
6.      String a = nope();      // (2)
7.      String b = null;        // (3)
8.      if (a.length() > 0) {   // (4)
9.          b = a;              // (5)
10.     }
11.     return b;               // (6)
12. }
```

Suppose you have commented out the line causing the static error in Question 2.

Now, which line contains a dynamic error ?

Select one:

- (1)
- (2)
- (3)
- (4) ✔
- (5)
- (6)

Your answer is correct.

The correct answer is: (4)

Question **4**

Correct

Mark 10.00 out of 10.00

Suppose we're building a robot and we want to specify the method

```
public static List<Point> findPath(Point initial, Point goal)
```

which is responsible for path-finding: determining a sequence of `Points` that the robot should move through to navigate from `initial` to `goal`, past any obstacles that might be in the way.

In the postcondition, we say that `findPath` will search for paths only up to a bounded length (set elsewhere), and that ***it will throw an exception if it fails to find one***.

Which exception is the best exception and its type to create, according to Lecture 6?

Select one:

- a. a checked `PathNotFoundException` ✔
- b. an unchecked `PathNotFoundException`
- c. a checked `NoPathException`
- d. an unchecked `NoPathException`

Your answer is correct.

The correct answer is: a checked `PathNotFoundException`

Question **5**

Incorrect

Mark 0.00 out of 10.00

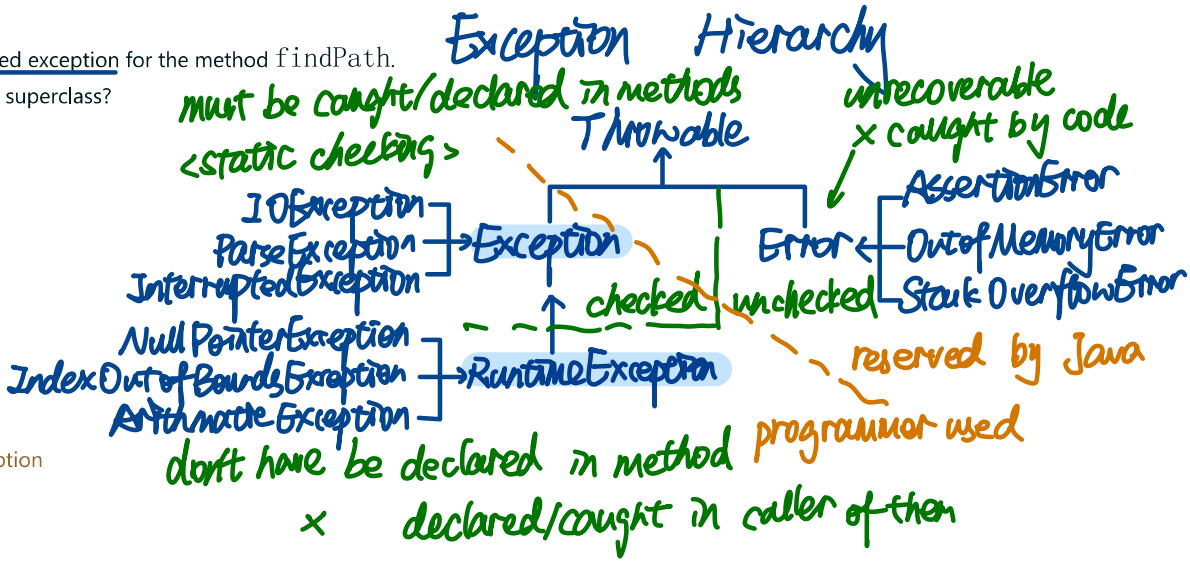
Suppose we define a checked exception for the method `findPath`.
What will we choose as our superclass?

Select one:

- a. Exception ✓
- b. Throwable ✘
- c. Error
- d. RuntimeException

Your answer is incorrect.

The correct answer is: Exception



Question **6**

Correct

Mark 10.00 out of 10.00

Suppose we define an unchecked exception for the method `findPath`.
What will we choose as our superclass?

Select one:

- a. Exception
- b. Throwable
- c. Error
- d. RuntimeException ✔

Your answer is correct.

The correct answer is: RuntimeException

Question **7**

Incorrect

Mark 0.00 out of 20.00

Consider this code below for analyzing some `Thing` objects:

```
1.  static List<Thing> allTheThings;
2.
3.  static void analyzeEverything() {
4.      analyzeThings();
5.  }
6.
7.  static void analyzeThings() {
8.      try {
9.          for (Thing t : allTheThings) {
10.             analyzeOneThing(t);
11.         }
12.     } catch (AnalysisException ae) {
13.         return;
14.     }
15. }
16.
17. static void analyzeOneThing(Thing t) throws AnalysisException {
18.     // ...
19.     // ... maybe go past the end of a list
20.     // ...
21. }
```

Note that `IndexOutOfBoundsException`, `NullPointerException`, and `OutOfMemoryError` are unchecked exceptions ; and `AnalysisException` is a checked exception.

Which exception could be thrown by a call to `analyzeEverything`?

Select one or more:

- [x] `AnalysisException` ✖
- [ ] `IndexOutOfBoundsException` ✓
- [ ] `NullPointerException` ✓
- [ ] `OutOfMemoryError` ✓

Your answer is incorrect.

The correct answers are: `IndexOutOfBoundsException`, `NullPointerException`, `OutOfMemoryError`

Question **8**

Correct

Mark 20.00 out of 20.00

If we want to construct a different object with the same values as the input object, we use a/an

copy constructor

✔ that performs a/an

deep copy

✔ instead of a shallow copy.

Question **9**

Correct

Mark 10.00 out of 10.00

Write one line of Java code that throws an `IllegalArgumentException` object with a message `"n must not be even"` to complete the if statement below :

```
1.  if (n % 2 == 0) {
2.      // your code here
3.
4.  }
```

Do not forget to end it with a semicolon.

Answer: throw new IllegalArgumentException("n must not be even"); ✔

The correct answer is: throw new IllegalArgumentException("n must not be even");

Question **10**

Incorrect

Mark 0.00 out of 10.00

When we throw an `IllegalArgumentException` object within a method, that method must advertise it in the method signature.

Select one:

- True ✖
- False

The correct answer is 'False'.

◄ CPT204 2223 Lab 7 Video Recording

Jump to...

Lab Exercise #7.1 Vehicle CONSTRUCTOR ►

Started on	Thursday, 20 April 2023, 14:55
State	Finished
Completed on	Thursday, 20 April 2023, 17:18
Time taken	2 hours 22 mins
Grade	**60.00** out of 110.00 (**54.55**%)

Question **1**

Correct

Mark 10.00 out of 10.00

Consider the following implementation:

```
1.  static int findFirst(int[] arr, int val) {
2.      for (int i = 0; i < arr.length; i++) {
3.          if (arr[i] == val) return i;
4.      }
5.      return arr.length;
6.  }
```

and this specification of `find`:

```
1.  static int find(int[] arr, int val)
2.    requires: nothing
3.    effects: returns largest index i such that
4.               arr[i] == val, or -1 if no such i
```

Which inputs demonstrates that `findFirst` does **not** satisfy this spec?

Select one or more:

- [x] [1, 2, 2], 2
- [ ] [1, 2, 3], 2
- [x] [1, 2, 3], 4
- [ ] none of all others, `findFirst` does satisfy this spec!

Your answer is correct.

The correct answers are: [1, 2, 2], 2, [1, 2, 3], 4

Question **2**

Incorrect

Mark 0.00 out of 10.00

Consider the following implementation:

```
1.  static int findLast(int[] arr, int val) {
2.      for (int i = arr.length -1 ; i >= 0; i--) {
3.          if (arr[i] == val) return i;
4.      }
5.      return -1;
6.  }
```

and this specification of `find`:

```
1.  static int find(int[] arr, int val)
2.    requires: nothing
3.    effects: returns largest index i such that
4.               arr[i] == val, or -1 if no such i
```

Which input demonstrates that `findLast` does **not** satisfy this spec?

Select one:

- a. [1, 2, 2], 2
- b. [1, 2, 3], 2
- c. [1, 2, 3], 4 ✖
- d. none of all others, `findLast` does satisfy this spec! ✓

Your answer is incorrect.

The correct answer is: none of all others, `findLast` does satisfy this spec!

Question **3**

Incorrect

Mark 0.00 out of 10.00

For each spec below, which one is **not** deterministic (underdetermined) ?

Select one:

a.
```
1.  static int find(int[] arr, int val)
2.    requires: val occurs in arr
3.    effects:  returns index i such that arr[i] == val
```

b.
```
1.  static int find(int[] arr, int val)
2.    requires: val occurs exactly once in arr
3.    effects:  returns index i such that arr[i] == val
```

c.
```
1.  static int find(int[] arr, int val)
2.    requires: nothing
3.    effects: returns largest index i such that arr[i] == val, or -1 if no such i
```

d.
```
1.  static int find(int[] arr, int val)
2.    requires: val occurs in arr
3.    effects: returns largest index i such that arr[i] == val
```

Your answer is incorrect.

The correct answer is:
```
1.  static int find(int[] arr, int val)
2.    requires: val occurs in arr
3.    effects:  returns index i such that arr[i] == val
```

deterministic: ✓ spec define only a single possible output
✗ allow implementor to choose from a set of legal output

declarative: ✓ characterize what the output should be
✗ explicitly say how to compute the output

strong : spec has a small set of legal implementation

Operational : give a series of steps that the method performs

Declarative : don't give details of intermediate steps.
give properties of < final outcome / how it's related to the initial state

- For a given specification, there may be many ways to express it declaratively:

a.
```
static boolean startsWith(String str, String prefix)
  effects: returns true if and only if there exists String suffix
           such that prefix + suffix == str
```

b.
```
static boolean startsWith(String str, String prefix)
  effects: returns true if and only if there exists integer i such that
           str.substring(0, i) == prefix
```

c.
```
static boolean startsWith(String str, String prefix)
  effects: returns true if the first prefix.length() characters of str are
           the characters of prefix, false otherwise
```

Question **4**

Incorrect

Mark 0.00 out of 10.00

Given this specification:

```
1.  static String join(String delimiter, String[] elements)
2.    effects: append together the strings in elements, but at each step,
3.             if there are more elements left, insert delimiter
```

Rewrite the spec so it is declarative, **not** operational.

Select one:

a.
```
1.  effects: returns elements joined together with copies of delimiter, i.e.
2.           elements[0] + delimiter + elements[1] + delimiter +
3.           ... + delimiter + elements[elements.length-1]
```

b.
```
1.  effects: returns the result of adding all elements to a
2.           new StringJoiner(delimiter)
```

c.
```
1.  effects: returns the result of looping through elements and
2.           alternately appending an element and the delimiter
```

d.
```
1.  effects: returns the result of recursive calls on the elements and
2.           while concatenating the delimiter
```

Your answer is incorrect.

The correct answer is:

```
1.  effects: returns elements joined together with copies of delimiter, i.e.
2.           elements[0] + delimiter + elements[1] + delimiter +
3.           ... + delimiter + elements[elements.length-1]
```

Question **5**

Correct

Mark 10.00 out of 10.00

When a specification is strengthened :

Select one:

- a. fewer implementations satisfy it, and more clients can use it
- b. fewer implementations satisfy it, and fewer clients can use it
- c. more implementations satisfy it, and fewer clients can use it
- d. more implementations satisfy it, and more clients can use it

Your answer is correct.

The correct answer is: fewer implementations satisfy it, and more clients can use it

Question **6**

Correct

Mark 10.00 out of 10.00

Which of the following is **false** about a pair of specifications *A* and *B*?

Select one:

a. *A* can be stronger than *B* and have a stronger precondition ✔

b. *A* can be stronger than *B* and have a weaker precondition

c. *A* can be stronger than *B* and have the same precondition

d. *A* can be incomparable to *B*

Your answer is correct.

The correct answer is: *A* can be stronger than *B* and have a stronger precondition

Question **7**

Correct

Mark 10.00 out of 10.00

Here are the `find` specifications from Lecture 8 :

```
1.  static int find^ExactlyOne(int[] a, int val)
2.    requires: val occurs exactly once in a
3.    effects:  returns index i such that a[i] == val
```

```
1.  static int find^OneOrMore,AnyIndex(int[] a, int val)
2.    requires: val occurs at least once in a
3.    effects:  returns index i such that a[i] == val
```

```
1.  static int find^OneOrMore,FirstIndex(int[] a, int val)
2.    requires: val occurs at least once in a
3.    effects:  returns lowest index i such that a[i] == val
```

```
1.  static int find^CanBeMissing(int[] a, int val)
2.    requires: nothing
3.    effects:  returns index i such that a[i] == val,
4.              or -1 if no such i
```

We already know that $\texttt{find}^{\texttt{OneOrMore, FirstIndex}}$ is stronger than $\texttt{find}^{\texttt{OneOrMore, AnyIndex}}$, which is stronger than $\texttt{find}^{\texttt{ExactlyOne}}$.

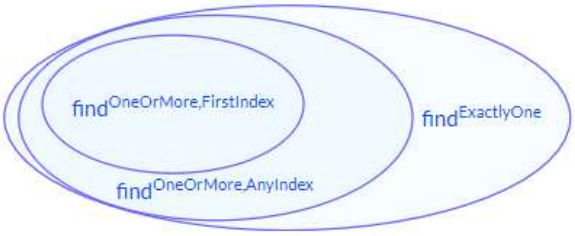
Where is $\texttt{find}^{\texttt{ExactlyOne}}$ on the diagram ?

Select one:

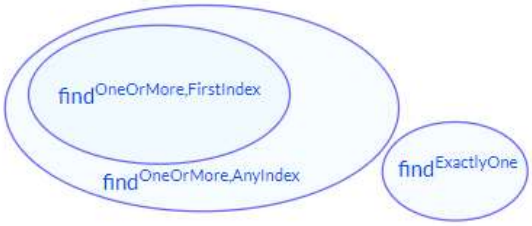
a.

b.

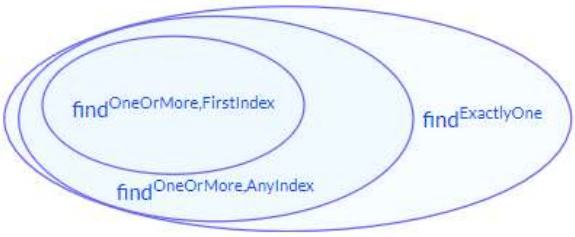
c. ✔



d.



Your answer is correct.



The correct answer is:

Question **8**

Correct

Mark 10.00 out of 10.00

Here are the `find` specifications from Lecture 8 :

```
1.  static int find^ExactlyOne(int[] a, int val)
2.    requires: val occurs exactly once in a
3.    effects:  returns index i such that a[i] == val
```

```
1.   static int find^OneOrMore,AnyIndex(int[] a, int val)
2.    requires: val occurs at least once in a
3.    effects:  returns index i such that a[i] == val
```

```
1.   static int find^OneOrMore,FirstIndex(int[] a, int val)
2.    requires: val occurs at least once in a
3.    effects:  returns lowest index i such that a[i] == val
```

```
1.  static int find^CanBeMissing(int[] a, int val)
2.    requires: nothing
3.    effects:  returns index i such that a[i] == val,
4.              or -1 if no such i
```

We already know that $\texttt{find}^{\texttt{OneOrMore, FirstIndex}}$ is stronger than $\texttt{find}^{\texttt{OneOrMore, AnyIndex}}$, which is stronger than $\texttt{find}^{\texttt{ExactlyOne}}$.

How does $\texttt{find}^{\texttt{CanBeMissing}}$ compare to $\texttt{find}^{\texttt{ExactlyOne}}$?

Select one:

- a. $\texttt{find}^{\texttt{CanBeMissing}}$ is stronger than $\texttt{find}^{\texttt{ExactlyOne}}$ ✔
- b. $\texttt{find}^{\texttt{CanBeMissing}}$ is weaker than $\texttt{find}^{\texttt{ExactlyOne}}$
- c. $\texttt{find}^{\texttt{CanBeMissing}}$ and $\texttt{find}^{\texttt{ExactlyOne}}$ are incomparable
- d. none of the options is correct

Your answer is correct.

The correct answer is: $\texttt{find}^{\texttt{CanBeMissing}}$ is stronger than $\texttt{find}^{\texttt{ExactlyOne}}$

Question **9**

Incorrect

Mark 0.00 out of 10.00

Here are the `find` specifications from Lecture 8 :

```
1.  static int find^ExactlyOne(int[] a, int val)
2.    requires: val occurs exactly once in a
3.    effects:  returns index i such that a[i] == val
```

1

```
1.   static int find^OneOrMore,AnyIndex(int[] a, int val)
2.    requires: val occurs at least once in a
3.    effects:  returns index i such that a[i] == val
```

2

```
1.   static int find^OneOrMore,FirstIndex(int[] a, int val)
2.    requires: val occurs at least once in a
3.    effects:  returns lowest index i such that a[i] == val
```

3

```
1.  static int find^CanBeMissing(int[] a, int val)
2.    requires: nothing
3.    effects:  returns index i such that a[i] == val,
4.              or -1 if no such i
```

4

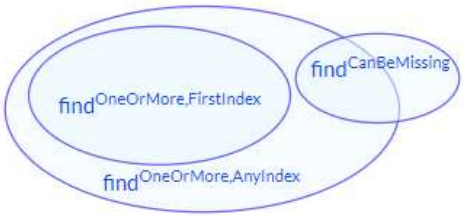
We already know that $\texttt{find}^{\texttt{OneOrMore, FirstIndex}}$ is stronger than $\texttt{find}^{\texttt{OneOrMore, AnyIndex}}$, which is stronger than $\texttt{find}^{\texttt{ExactlyOne}}$.

Where is $\texttt{find}^{\texttt{CanBeMissing}}$ on the diagram ?

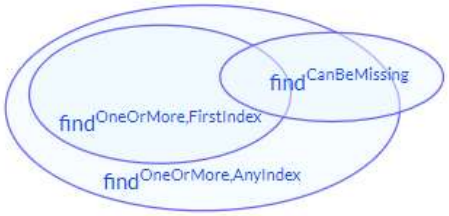
Select one:

a. ✖

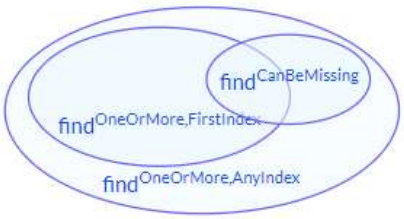
b.



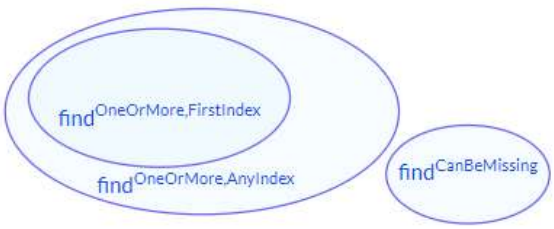
c.



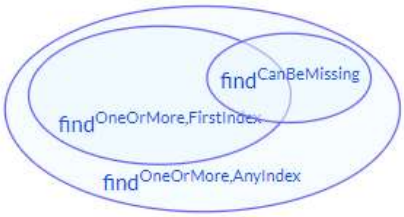
d. ✓



e.



Your answer is incorrect.



The correct answer is:

Question **10**

Incorrect

Mark 0.00 out of 10.00

In our ARList implementation, we use a technique called

resize array doubling

✖ that doubles the size of the array whenever it is full.

Question **11**

Correct

Mark 10.00 out of 10.00

You want to use a generic array using casting in your implementation of a data structure.
For example, you write the following line in your constructor or your method:

```
1.  T[] elements = (T[]) new Object[numOfElements];
```

Write the annotation that you need to write before the constructor or the method:

Answer: @SuppressWarnings("unchecked") ✔

The correct answer is: @SuppressWarnings("unchecked")

◄ CPT204 2223 Lab 9 Video Recording

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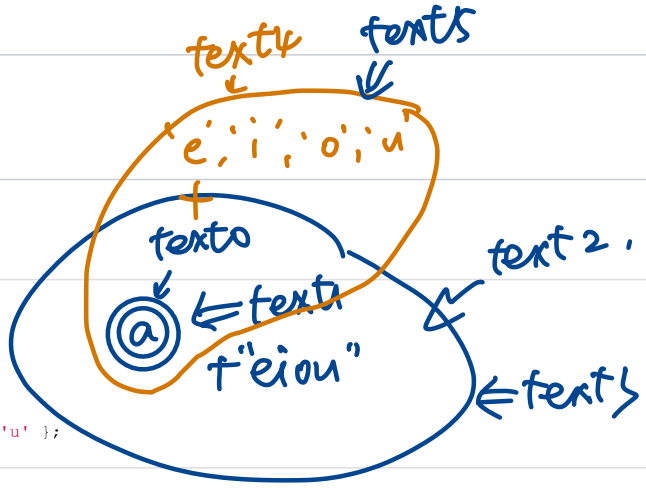
Lab Exercise #9.1 ARDeque EMPTY CONSTRUCTOR ►

Started on	Thursday, 27 April 2023, 12:43
State	Finished
Completed on	Thursday, 27 April 2023, 14:54
Time taken	2 hours 10 mins
Marks	0.00/150.00
Grade	**0.00** out of 160.00 (**0**%)

Question **1**

Incorrect

Mark 0.00 out of 10.00



Consider the following code, executed in order:

```
1.  char text0 = 'a';
2.  final char text1 = vowel0;
3.
4.  String text2 = text1 + "eiou";
5.  final String text3 = text2;
6.
7.  char[] text4 = new char[] { text0, 'e', 'i', 'o', 'u' };
8.  final char[] text5 = text4;
```

Which of the following statements are legal Java,
that is, produce **no** compiler error if placed ***after*** the code above?

Select one:

- a. text2 = text3;
- b. text1 = text0;
- c. text5 = text4;
- d. text3 = text2;

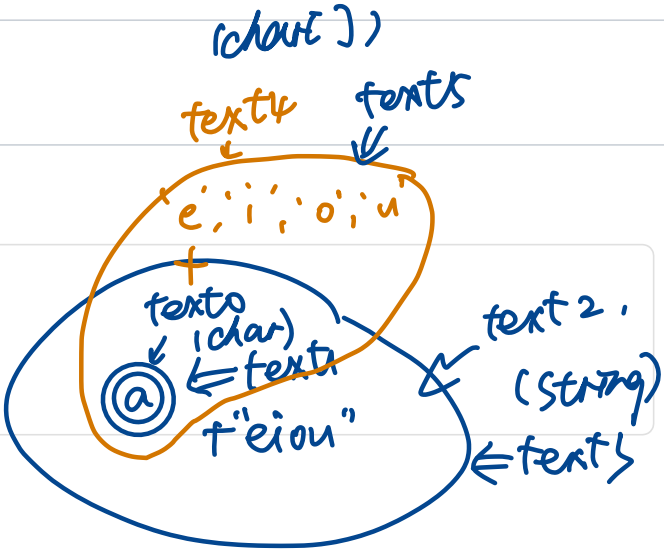
Your answer is incorrect.

The correct answer is: text2 = text3;

Question **2**

Incorrect

Mark 0.00 out of 10.00



Consider the following code, executed in order:

```
1.  char text0 = 'a';
2.  final char text1 = vowel0;
3.
4.  String text2 = text1 + "eiou";
5.  final String text3 = text2;
6.
7.  char[] text4 = new char[] { text0, 'e', 'i', 'o', 'u' };
8.  final char[] text5 = text4;
```

Which of the following statements are legal Java,
that is, produce **no** compiler error if placed ***after*** the code above?

Select one:

- a. text5[0] = 'x';
- b. text2[0] = 'x';
- c. text3[0] = 'x';
- d. text0[0] = 'x'; ✖

Your answer is incorrect.

The correct answer is: text5[0] = 'x';

Question **3**

Incorrect

Mark 0.00 out of 10.00

Consider this (incomplete) method:

```
1.      /**
2.       * Solves quadratic equation ax^2 + bx + c = 0.
3.       *
4.       * @param a quadratic coefficient, requires a != 0
5.       * @param b linear coefficient
6.       * @param c constant term
7.       * @return a list of the real roots of the equation
8.       */
9.      public static List<Double> quadraticRoots(final int a, final int b, final int c) {
10.         List<Double> roots = new ArrayList<Double>();
11.         // A
12.         ... // compute roots
13.         // B
14.         return roots;
15.     }
```

What assertion would be reasonable to write at position **A** (*before* computing the roots) ?

Select one:

- a. assert a != 0;
- b. assert b != 0; ✖
- c. assert c != 0;
- d. assert roots.size() >= 0;
- e. assert roots.size() <= 2;

Your answer is incorrect.

The correct answer is: assert a != 0;

Question **4**

Incorrect

Mark 0.00 out of 10.00

Consider this (incomplete) method:

```
1.      /**
2.       * Solves quadratic equation ax^2 + bx + c = 0.
3.       *
4.       * @param a quadratic coefficient, requires a != 0
5.       * @param b linear coefficient
6.       * @param c constant term
7.       * @return a list of the real roots of the equation
8.       */
9.      public static List<Double> quadraticRoots(final int a, final int b, final int c) {
10.         List<Double> roots = new ArrayList<Double>();
11.         // A
12.         ... // compute roots
13.         // B
14.         return roots;
15.     }
```

What assertion would be reasonable to write at position **B** (*after* computing the roots) ?

Select one:

- a. assert a != 0;
- b. assert b != 0; ✖
- c. assert c != 0;
- d. assert roots.size() >= 0;
- e. assert roots.size() <= 2;

Your answer is incorrect.

The correct answer is: assert roots.size() <= 2;

Question **5**

Incorrect

Mark 0.00 out of 10.00

Consider the following code, which is *missing* some variable declarations :

```
1.  class Apartment {
2.
3.      Apartment(String newAddress) {
4.          this.address = newAddress;
5.          this.roommates = new HashSet<Person>();
6.      }
7.
8.      String getAddress() {
9.          return address;
10.     }
11.
12.     void addRoommate(Person newRoommate) {
13.         roommates.add(newRoommate);
14.         if (roommates.size() > MAXIMUM_OCCUPANCY) {
15.             roommates.remove(newRoommate);
16.             throw new TooManyPeopleException();
17.         }
18.     }
19.
20.     int getMaximumOccupancy() {
21.         return MAXIMUM_OCCUPANCY;
22.     }
23. }
```

Which one is the best declaration for the `roommates` variable?

Select one:

- a. final Set<Person> roommates;
- b. List<Person> roommates;
- c. Set<Person> roommates;
- d. HashSet<Person> roommates;

Your answer is incorrect.

The correct answer is: final Set<Person> roommates;

1. when declaring a variable:
   - ✓ use abstract types like Set, List
   - ✗ rather than concrete types like HashSet, ArrayList
2. final:
   - It never needs to be reassigned, only mutated.

Question **6**

Incorrect

Mark 0.00 out of 10.00

Consider the following code, which is *missing* some variable declarations :

```
1.  class Apartment {
2.
3.      Apartment(String newAddress) {
4.          this.address = newAddress;
5.          this.roommates = new HashSet<Person>();
6.      }
7.
8.      String getAddress() {
9.          return address;
10.     }
11.
12.     void addRoommate(Person newRoommate) {
13.         roommates.add(newRoommate);
14.         if (roommates.size() > MAXIMUM_OCCUPANCY) {
15.             roommates.remove(newRoommate);
16.             throw new TooManyPeopleException();
17.         }
18.     }
19.
20.     int getMaximumOccupancy() {
21.         return MAXIMUM_OCCUPANCY;
22.     }
23. }
```

Which one is the best declaration for the MAXIMUM_OCCUPANCY variable?

Select one:

- a. static final int MAXIMUM_OCCUPANCY = 8;
- b. final int MAXIMUM_OCCUPANCY = 8;
- c. static int MAXIMUM_OCCUPANCY = 8;
- d. int MAXIMUM_OCCUPANCY = 8;
- e. public int MAXIMUM_OCCUPANCY = 8;
- f. public static int MAXIMUM_OCCUPANCY = 8;

Your answer is incorrect.

The correct answer is: static final int MAXIMUM_OCCUPANCY = 8;

static : ✓ class variable : field – share by all class instance.
× instance variable

final : never be reassigned

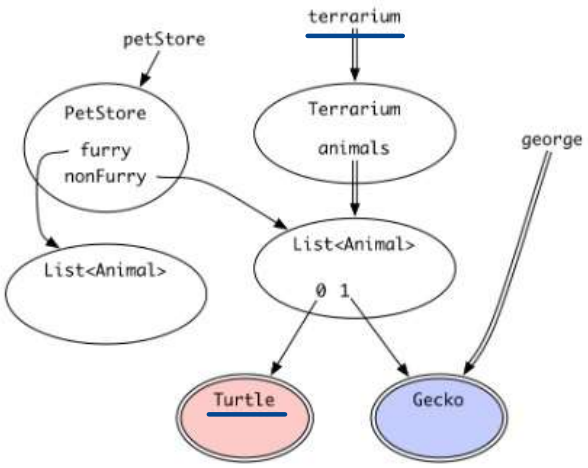
private : prevent the client from directly manipulating the class

Question **7**

Incorrect

Mark 0.00 out of 10.00

Consider the following snapshot diagram:



Is it possible that a client with the variable terrarium could modify the Turtle in red?

Select one:

a. No, because the "Turtle" is immutable

b. Yes, because all the references between "terrarium" and the "Turtle" are mutable

c. Yes, because of some reference between "terrarium" and the "Turtle" that is mutable

d. Yes, because the "Turtle" is mutable

e. No, because of some reference between "terrarium" and the "Turtle" that is immutable ✖

f. No, because all the references between "terrarium" and the "Turtle" are immutable

Your answer is incorrect.

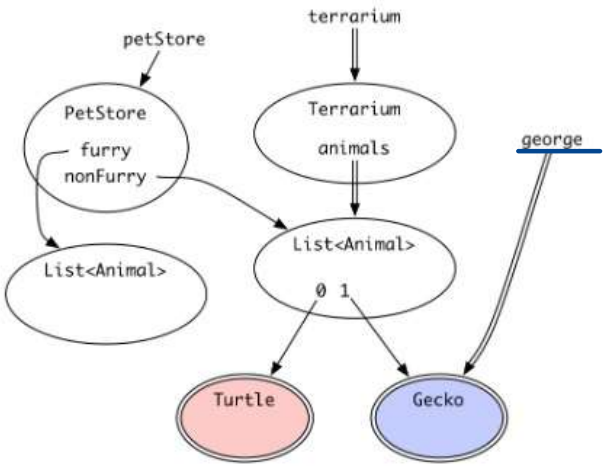
The correct answer is: No, because the "Turtle" is immutable

Question **8**

Incorrect

Mark 0.00 out of 10.00

Consider the following snapshot diagram:



Is it possible that a client with the variable george could modify the Gecko in blue?

Select one:

- a. No, because the "Gecko" is immutable
- b. Yes, because all the references between "george" and the "Gecko" are mutable
- c. Yes, because of some reference between "george" and the "Gecko" that is mutable
- d. Yes, because the "Gecko" is mutable
- e. No, because of some reference between "george" and the "Gecko" that is immutable
- f. No, because all the references between "george" and the "Gecko" are immutable ✖

Your answer is incorrect.

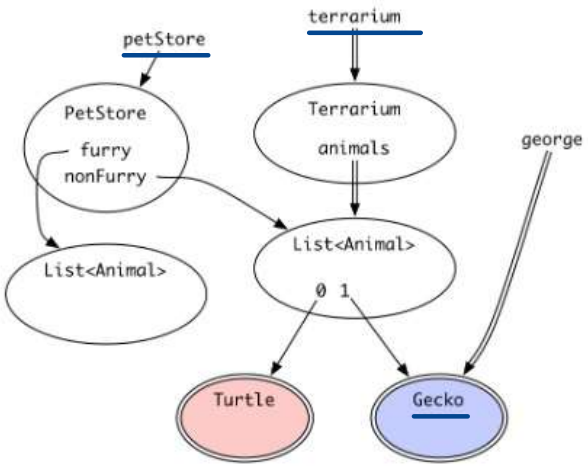
The correct answer is: No, because the "Gecko" is immutable

Question **9**

Incorrect

Mark 0.00 out of 10.00

Consider the following snapshot diagram:



Is it possible that a client with the variable petStore could do something such that a client with the variable terrarium could no longer access the Gecko in blue?

Select one:

- a. No, because the "Gecko" is immutable ✖
- b. Yes, because all the references between "petStore" and the "Gecko" are mutable
- c. Yes, because of some reference between "petStore" and the "Gecko" that is mutable ✓
- d. Yes, because the "Gecko" is mutable
- e. No, because of some reference between "petStore" and the "Gecko" that is immutable
- f. No, because all the references between "petStore" and the "Gecko" are immutable

Your answer is incorrect.

The correct answer is: Yes, because of some reference between "petStore" and the "Gecko" that is mutable

Question **10**

Incorrect

Mark 0.00 out of 10.00

Consider `MyIterator`'s `next` method:

```
1.  public class MyIterator {
2.
3.      private final ArrayList<String> list;
4.      private int index;
5.
6.      ...
7.
8.      /**
9.       * Get the next element of the list.
10.      * Requires: hasNext() returns true.
11.      * Modifies: this iterator to advance it to the element
12.      *           following the returned element.
13.      * @return next element of the list
14.      */
15.     public String next() {
16.         final String element = list.get(index);
17.         index++;
18.         return element;
19.     }
20. }
```

What is the type of the input to `next`?

Select one:

- a. MyIterator ✓
- b. void
- c. ArrayList
- d. String
- e. boolean
- f. int ✗

Your answer is incorrect.

The correct answer is: MyIterator

this: automatically in scope in the body of an object method

write "this.": ×

its implicit to access a field.

e.g. lBt → this.lBt

index → this.index

✓ a local variable of the same name is in scope, the local variable will take precedence.

lBt → local variable: lBt

↛ object class variable: this.lBt

e.g. in constructors

Question **11**

Incorrect

Mark 0.00 out of 10.00

Consider `MyIterator`'s `next` method:

```
1.  public class MyIterator {
2.
3.      private final ArrayList<String> list;
4.      private int index;
5.
6.      ...
7.
8.      /**
9.       * Get the next element of the list.
10.      * Requires: hasNext() returns true.
11.      * Modifies: this iterator to advance it to the element
12.      *           following the returned element.
13.      * @return next element of the list
14.      */
15.     public String next() {
16.         final String element = list.get(index);
17.         index++;
18.         return element;
19.     }
20. }
```

What is the type of the output to `next`?

Select one:

- a. MyIterator
- b. void ✖
- c. ArrayList
- d. String ✓
- e. boolean
- f. int

Your answer is incorrect.

The correct answer is: String

Question **12**

Incorrect

Mark 0.00 out of 10.00

Consider `MyIterator`'s `next` method:

```
1.  public class MyIterator {
2.
3.      private final ArrayList<String> list;
4.      private int index;
5.
6.      ...
7.
8.      /**
9.       * Get the next element of the list.
10.      * Requires: hasNext() returns true.
11.      * Modifies: this iterator to advance it to the element
12.      *           following the returned element.
13.      * @return next element of the list
14.      */
15.     public String next() {
16.         final String element = list.get(index);
17.         ++index;
18.         return element;
19.     }
20. }
```

`next` has the precondition `requires: hasNext() returns true`.

Which input to `next` is constrained by the precondition?

Select one:

- a. this
- b. list ✖
- c. index
- d. element
- e. hasNext

Your answer is incorrect.

The correct answer is: this

Question **13**

Incorrect

Mark 0.00 out of 10.00

Consider `MyIterator`'s `next` method:

```
1.  public class MyIterator {
2.
3.      private final ArrayList<String> list;
4.      private int index;
5.
6.      ...
7.
8.      /**
9.       * Get the next element of the list.
10.      * Requires: hasNext() returns true.
11.      * Modifies: this iterator to advance it to the element
12.      *           following the returned element.
13.      * @return next element of the list
14.      */
15.     public String next() {
16.         final String element = list.get(index);
17.         ++index;
18.         return element;
19.     }
20. }
```

→ index too large. triggering an unchecked IndexOutOfBoundsException

=null

When the precondition is **not** satisfied, the implementation is free to do anything.

What does *this particular implementation* do when the precondition is **not** satisfied?

Select one:

- a. throw an unchecked exception ✓
- b. throw a checked exception
- c. return null ✗
- d. return some other element of the list

Your answer is incorrect.

The correct answer is: throw an unchecked exception

Question **14**

Incorrect

Mark 0.00 out of 10.00

Consider `MyIterator`'s `next` method:

```
1.  public class MyIterator {
2.
3.      private final ArrayList<String> list;
4.      private int index;
5.
6.      ...
7.
8.      /**
9.       * Get the next element of the list.
10.      * Requires: hasNext() returns true.
11.      * Modifies: this iterator to advance it to the element
12.      *           following the returned element.
13.      * @return next element of the list
14.      */
15.     public String next() {
16.         final String element = list.get(index);
17.         ++index;
18.         return element;
19.     }
20. }
```

Part of the postcondition of `next` is: `@return next element of the list`.

Which output from `next` are constrained by that postcondition?

Select one:

- a. the return value
- b. this
- c. hasNext
- d. list ✖

Your answer is incorrect.

The correct answer is: the return value

Question **15**

Incorrect

Mark 0.00 out of 10.00

Consider `MyIterator`'s `next` method:

```
1.  public class MyIterator {
2.
3.      private final ArrayList<String> list;
4.      private int index;
5.
6.      ...
7.
8.      /**
9.       * Get the next element of the list.
10.      * Requires: hasNext() returns true.
11.      * Modifies: this iterator to advance it to the element
12.      *           following the returned element.
13.      * @return next element of the list
14.      */
15.     public String next() {
16.         final String element = list.get(index);
17.         ++index;
18.         return element;
19.     }
20. }
```

Another part of the postcondition of `next` is `modifies: this iterator to advance it to the element following the returned element.`

What is constrained by that postcondition?

Select one:

- a. the return value ✖
- b. this ✓
- c. hasNext
- d. list

Your answer is incorrect.

The correct answer is: this

◄ CPT204 2223 Lab 10 Video Recording

Jump to...

Lab Exercise #10.1 ARDequeIterator CONSTRUCTOR and HASNEXT ►

Started on	Friday, 5 May 2023, 00:01
State	Finished
Completed on	Friday, 5 May 2023, 00:02
Time taken	8 secs
Grade	**0.00** out of 150.00 (**0**%)

Question **1**

Not answered

Marked out of 10.00

Consider an abstract data type `Bool`.
The type has the following operations:

```
1.  true : Bool
2.  false : Bool
3.
4.  and : Bool × Bool → Bool
5.  or : Bool × Bool → Bool
6.  not : Bool → Bool
```

where the first two operations construct the two values of the type,
and last three operations have the usual meanings of logical *and*, logical *or*, and logical *not* on those values.

The following are possible ways that `Bool` might be implemented and still be able to satisfy the specs of the operations, except one.
Which one is **not** the correct way?

Select one:

- a. As a `long` value in which all possible values mean `true`.
- b. As a single bit, where 1 means `true` and 0 means `false`.
- c. As an `int` value where 2 means `true` and 5 means `false`.
- d. As a reference to a `String` object where `"false"` to mean `true` and `"true"` to mean `false`

Your answer is incorrect.

The correct answer is: As a `long` value in which all possible values mean `true`.

Question **2**

Not answered

Marked out of 10.00

The method below is an operation on an abstract data type from the Java library.

It is followed by the link of its documentation.

Read it, and classify the operation :

Integer.valueOf()

https://docs.oracle.com/javase/8/docs/api/java/lang/Integer.html#valueOf-java.lang.String-

Select one:

- a. creator
- b. producer
- c. mutator
- d. observer

Your answer is incorrect.

The correct answer is: creator

Question **3**

Not answered

Marked out of 10.00

The method below is an operation on an abstract data type from the Java library.

It is followed by the link of its documentation.

Read it, and classify the operation :

BigInteger.mod()

https://docs.oracle.com/javase/8/docs/api/java/math/BigInteger.html#mod-java.math.BigInteger-

Select one:

- a. creator
- b. producer
- c. mutator
- d. observer

Your answer is incorrect.

The correct answer is: producer

String. immutable
C. String constructors, valueOf static methods
P. concat, substring, toUpperCase
O. length, charAt
× M.

Question **4**

Not answered

Marked out of 10.00

The method below is an operation on an abstract data type from the Java library.

It is followed by the link of its documentation.

Read it, and classify the operation :

List.addAll() change contents of the list

https://docs.oracle.com/javase/8/docs/api/java/util/List.html#addAll-java.util.Collection-

Select one:

- a. creator
- b. producer
- ✓ c. mutator
- d. observer

Your answer is incorrect.

The correct answer is: mutator

Question **5**

Not answered

Marked out of 10.00

The method below is an operation on an abstract data type from the Java library.

It is followed by the link of its documentation.

Read it, and classify the operation :

Collections.unmodifiableList() List → List <different>

https://docs.oracle.com/javase/8/docs/api/java/util/Collections.html#unmodifiableList-java.util.List-

Select one:

- a. creator
- ✓ b. producer
- c. mutator
- d. observer

Your answer is incorrect.

The correct answer is: producer

Question **6**

Not answered

Marked out of 10.00

The method below is an operation on an abstract data type from the Java library.

It is followed by the link of its documentation.

Read it, and classify the operation :

String.toUpperCase() String → String <different>

https://docs.oracle.com/javase/8/docs/api/java/lang/String.html#toUpperCase--

Select one:

- a. creator
- b. producer
- c. mutator
- d. observer

Your answer is incorrect.

The correct answer is: producer

Question **7**

Not answered

Marked out of 10.00

The method below is an operation on an abstract data type from the Java library.

It is followed by the link of its documentation.

Read it, and classify the operation :

Set.contains() Set → boolean

https://docs.oracle.com/javase/8/docs/api/java/util/Set.html#contains-java.lang.Object-

Select one:

- a. creator
- b. producer
- c. mutator
- d. observer

Your answer is incorrect.

The correct answer is: observer

Question **8**

Not answered

Marked out of 10.00

The method below is an operation on an abstract data type from the Java library.

It is followed by the link of its documentation.

Read it, and classify the operation :

BufferedReader.readLine()

https://docs.oracle.com/javase/8/docs/api/java/io/BufferedReader.html#readLine--

Select one:

- a. creator
- b. producer
- c. mutator ← change the state of the BufferedReader
- d. observer

Your answer is incorrect.

The correct answer is: mutator

Question **9**

Not answered

Marked out of 10.00

Consider the following abstract data type.

```
/**
 * Represents a family that lives in a household together.
 * A family always has at least one person in it.
 * Families are mutable.
 */
class Family {
    // the people in the family, sorted from oldest to youngest, with no duplicates.
    public List<Person> people;

    /**
     * @return a list containing all the members of the family, with no duplicates.
     */
    public List<Person> getMembers() {
        return people;
    }
}
```

Here is a client of this abstract data type:

```
void client1(Family f) {
    // get youngest person in the family
    Person baby = f.people.get(f.people.size() - 1);
    ...
}
```

Assume all this code works correctly (both `Family` and `client1`) and passes all its tests.

Now `Family`'s representation is changed from a `List` to `Set`, as shown:

```
/**
 * Represents a family that lives in a household together.
 * A family always has at least one person in it.
 * Families are mutable.
 */
class Family {
    // the people in the family
    public Set<Person> people;

    /**
     * @return a list containing all the members of the family, with no duplicates.
     */
    public List<Person> getMembers() {
        return new ArrayList<>(people);
    }
}
```

Assume that `Family` compiles correctly after the change.

Which of the following statements are true about `client1` after `Family` is changed?

Select one:

- a. `client1` is independent of `Family`'s representation, so it keeps working correctly.
- b. `client1` depends on `Family`'s representation, and the dependency would be caught as a static error.
- c. `client1` depends on `Family`'s representation, and the dependency would be caught as a dynamic error.
- d. `client1` depends on `Family`'s representation, and the dependency would not be caught but would produce a wrong answer at runtime.
- e. `client1` depends on `Family`'s representation, and the dependency would not be caught but would (luckily) still produce the same answer.

Your answer is incorrect.

The correct answer is: `client1` depends on `Family`'s representation, and the dependency would be caught as a static error.

Question **10**

Not answered

Marked out of 10.00

Consider the following abstract data type.

```
/**
 * Represents a family that lives in a household together.
 * A family always has at least one person in it.
 * Families are mutable.
 */
class Family {
    // the people in the family, sorted from oldest to youngest, with no duplicates.
    public List<Person> people;

    /**
     * @return a list containing all the members of the family, with no duplicates.
     */
    public List<Person> getMembers() {
        return people;
    }
}
```

Here is a client of this abstract data type:

```
void client2(Family f) {
    // get size of the family
    int familySize = f.people.size();
    ...
}
```

Assume all this code works correctly (both `Family` and `client2`) and passes all its tests.

Now `Family`'s representation is changed from a `List` to `Set`, as shown:

```
/**
 * Represents a family that lives in a household together.
 * A family always has at least one person in it.
 * Families are mutable.
 */
class Family {
    // the people in the family
    public Set<Person> people;

    /**
     * @return a list containing all the members of the family, with no duplicates.
     */
    public List<Person> getMembers() {
        return new ArrayList<>(people);
    }
}
```

Assume that `Family` compiles correctly after the change.

Which of the following statements are true about `client2` after `Family` is changed?

Select one:

- a. `client2` is independent of `Family`'s representation, so it keeps working correctly.
- b. `client2` depends on `Family`'s representation, and the dependency would be caught as a static error.
- c. `client2` depends on `Family`'s representation, and the dependency would be caught as a dynamic error.
- d. `client2` depends on `Family`'s representation, and the dependency would not be caught but would produce a wrong answer at runtime.
- e. `client2` depends on `Family`'s representation, and the dependency would not be caught but would (luckily) still produce the same answer.

Your answer is incorrect.

The correct answer is: `client2` depends on `Family`'s representation, and the dependency would not be caught but would (luckily) still produce the same answer.

Question **11**

Not answered

Marked out of 10.00

Consider the following abstract data type.

```
/**
 * Represents a family that lives in a household together.
 * A family always has at least one person in it.
 * Families are mutable.
 */
class Family {
    // the people in the family, sorted from oldest to youngest, with no duplicates.
    public List<Person> people;

    /**
     * @return a list containing all the members of the family, with no duplicates.
     */
    public List<Person> getMembers() {
        return people;
    }
}
```

Here is a client of this abstract data type:

```
void client3(Family f) {
    // get any person in the family
    Person anybody = f.getMembers().get(0);
    ...
}
```

Assume all this code works correctly (both `Family` and `client3`) and passes all its tests.

Now `Family`'s representation is changed from a `List` to `Set`, as shown:

```
/**
 * Represents a family that lives in a household together.
 * A family always has at least one person in it.
 * Families are mutable.
 */
class Family {
    // the people in the family
    public Set<Person> people;

    /**
     * @return a list containing all the members of the family, with no duplicates.
     */
    public List<Person> getMembers() {
        return new ArrayList<>(people);
    }
}
```

Assume that `Family` compiles correctly after the change.

Which of the following statements are true about `client3` after `Family` is changed?

Select one:

- a. `client3` is independent of `Family`'s representation, so it keeps working correctly.
- b. `client3` depends on `Family`'s representation, and the dependency would be caught as a static error.
- c. `client3` depends on `Family`'s representation, and the dependency would be caught as a dynamic error.
- d. `client3` depends on `Family`'s representation, and the dependency would not be caught but would produce a wrong answer at runtime.
- e. `client3` depends on `Family`'s representation, and the dependency would not be caught but would (luckily) still produce the same answer.

Your answer is incorrect.

The correct answer is: `client3` is independent of `Family`'s representation, so it keeps working correctly.

Question **12**

Not answered

Marked out of 10.00

spec

rep

spec.

imp.

```
1  /**
2   * Represents a family that lives in a household together.
3   * A family always has at least one person in it.
4   * Families are mutable.
5   */
6  public class Family {
7      // the people in the family, sorted from oldest to youngest, with no duplicates.
8      private List<Person> people;
9
10     /**
11      * @return a list containing all the members of the family, with no duplicates.
12      */
13     public List<Person> getMembers() {
14         return people;
15     }
16 }
```

Which line is part of the representations?

Select one:

- a. lines 1-5
- b. line 6
- c. line 8 ✓
- d. lines 10-12
- e. line 13
- f. line 14

Your answer is incorrect.

The correct answer is: line 8

Specification of an ADT { name of the class
Javadoc comment before the class
specifications of its public methods and fields
< Javadoc + method signature >

→ visible to client

Representation of an ADT { its fields
any assumptions or requirement about those fields

Implementation — method implementations that manipulate its rep.

Field — hold data

- { primitive type (8)
  Reference type → initial with "null" value
- define a field : type . name . value of the field
- type of fields/variables { Local variable → defined inside method
  Global variable → defined at the top of class file
  parameter → included upon calling the method.

Question **13**

Not answered

Marked out of 10.00

```
1  /**
2   * Represents a family that lives in a household together.
3   * A family always has at least one person in it.
4   * Families are mutable.
5   */
6  public class Family {
7      // the people in the family, sorted from oldest to youngest, with no duplicates.
8      private List<Person> people;
9
10     /**
11      * @return a list containing all the members of the family, with no duplicates.
12      */
13     public List<Person> getMembers() {
14         return people;
15     }
16 }
```

Which line is part of the implementations?

Select one:

- a. lines 1-5
- b. line 6
- c. line 8
- d. lines 10-12
- e. line 13
- f. line 14

Your answer is incorrect.

The correct answer is: line 14

Question **14**

Not answered

Marked out of 10.00

Choose the correct statement.

Select one:

- a. If you are a subclass of an interface, you have to override all of its method signatures.
- b. If you override a method, you have to annotate the method with @Override
- c. Method overloading is when you have multiple methods with the same signature, but different names.
- d. An object o is instantiated with static type S and dynamic type D.
  D is a subclass of S, and D overloads method m() of S.
  At runtime, o.m() will call method m() that belongs to D.

Your answer is incorrect.

The correct answer is: If you are a subclass of an interface, you have to override all of its method signatures.

Question **15**

Not answered

Marked out of 10.00

Which statement is **incorrect** about default method ?

Select one:

a. Default method must be overridden by the subclass of the interface.

b. Default method is implemented in an interface.

c. Default method is inherited by the subclass of the interface.

d. Default method that is overridden by a subclass of the interface will be run because of the dynamic method selection.

Your answer is incorrect.

The correct answer is: Default method must be overridden by the subclass of the interface.

◄ CPT204 2223 Lab 11 Video Recording

Jump to...

Lab Exercise #11.1 ARDeque DEQUE INTERFACE ►

Started on	Tuesday, 9 May 2023, 21:55
State	Finished
Completed on	Tuesday, 9 May 2023, 21:55
Time taken	11 secs
Grade	**0.00** out of 30.00 (**0**%)

Question **1**

Not answered

Marked out of 10.00

Consider the latest implementation of `Duration` in the lecture:

```
1.  public class Duration {
2.      private final int mins;
3.      private final int secs;
4.
5.      /** Make a duration lasting for m minutes and s seconds. */
6.      public Duration(int m, int s) {
7.          mins = m; secs = s;
8.      }
9.      /** @return length of this duration in seconds */
10.     public long getLength() {
11.         return mins*60 + secs;
12.     }
13.
14.     private static final int CLOCK_SKEW = 5; // seconds
15.
16.     @Override
17.     public boolean equals (Object thatObject) {
18.         if (!(thatObject instanceof Duration)) return false;
19.         Duration thatDuration = (Duration) thatObject;
20.         return Math.abs(this.getLength() - thatDuration.getLength()) <= CLOCK_SKEW;
21.     }
22. }
```

Suppose these Duration objects are created:

```
1.  Duration d_0_60 = new Duration(0, 60);
2.  Duration d_1_00 = new Duration(1, 0);
3.  Duration d_0_57 = new Duration(0, 57);
4.  Duration d_1_03 = new Duration(1, 3);
```

Which of the following expressions return **true**?

Select one or more:

- [ ] i. d_0_57.equals(d_1_03)
- [x] ii. d_0_60.equals(d_1_00)
- [x] iii. d_1_00.equals(d_0_60)
- [x] iv. d_1_00.equals(d_1_00)
- [x] v. d_0_57.equals(d_1_00)
- [x] vi. d_0_60.equals(d_1_03)

Your answer is incorrect.

The correct answers are: d_0_60.equals(d_1_00), d_1_00.equals(d_0_60), d_1_00.equals(d_1_00), d_0_57.equals(d_1_00), d_0_60.equals(d_1_03)

Question **2**

Not answered

Marked out of 10.00

Consider the latest implementation of `Duration` in the lecture:

```
1.  public class Duration {
2.      private final int mins;
3.      private final int secs;
4.
5.      /** Make a duration lasting for m minutes and s seconds. */
6.      public Duration(int m, int s) {
7.          mins = m; secs = s;
8.      }
9.      /** @return length of this duration in seconds */
10.     public long getLength() {
11.         return mins*60 + secs;
12.     }
13.
14.     private static final int CLOCK_SKEW = 5; // seconds
15.
16.     @Override
17.     public boolean equals (Object thatObject) {
18.         if (!(thatObject instanceof Duration)) return false;
19.         Duration thatDuration = (Duration) thatObject;
20.         return Math.abs(this.getLength() - thatDuration.getLength()) <= CLOCK_SKEW;
21.     }
22. }
```

Which properties of an equivalence relation are violated by this `equals()` method?

Select one:

- a. recursivity
- b. reflexivity
- c. sensitivity
- d. symmetry
- e. transitivity

Your answer is incorrect.

The correct answer is: transitivity

Question **3**

Not answered

Marked out of 10.00

Suppose you want to show that an equality operation is buggy because it is **not** reflexive.

How many objects do you need for a counterexample to reflexivity?

Select one:

- a. 0 objects
- b. 1 object
- c. 2 objects
- d. 3 objects
- e. 4 objects

Your answer is incorrect.

The correct answer is: 1 object

Started on	Wednesday, 17 May 2023, 13:26
State	Finished
Completed on	Thursday, 18 May 2023, 21:09
Time taken	1 day 7 hours
Grade	**0.00** out of 30.00 (**0**%)

Question **1**

Not answered

Marked out of 10.00

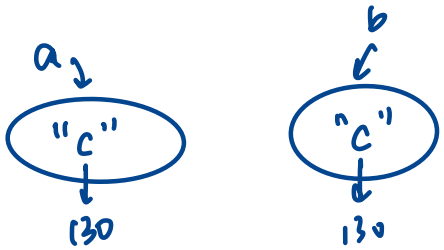
Here is the code again from the slide Autoboxing and Equality:

```
1.  Map<String, Integer> a = new HashMap<>(), b = new HashMap<>();
2.  a.put("c", 130); // put ints into the map
3.  b.put("c", 130);
```

What is the compile-time type of the expression `130`?

After executing `a.put("c", 130)`, what is the runtime type that is used to represent the value `130` in the map?

What is the compile-time type of `a.get("c")`?



Select one:

- a. int, Integer, Integer
- b. int, Integer, int
- c. Integer, int, int
- d. int, int, Integer
- e. Integer, int, Integer
- f. Integer, Integer, int

Your answer is incorrect.

30 is an integer literal, so its compile-time type is `int`.

In the `Map<String, Integer>`, the keys are `String`s and the values are `Integer`s. So when 130 is placed in the map, it is automatically *boxed* up into a fresh `Integer` object.

The `get()` operation for a `Map<K, V>` returns values of type `V`, so for a `Map<String, Integer>`, the type would be `Integer`.

The correct answer is: int, Integer, Integer

Question **2**

Incorrect

Mark 0.00 out of 10.00

Here is the code again from the slide Autoboxing and Equality:

```
1.  Map<String, Integer> a = new HashMap<>(), b = new HashMap<>();
2.  a.put("c", 130); // put ints into the map
3.  b.put("c", 130);
```

Integer : reference

After this code executes, what would `a.get("c").equals(b.get("c"))` return?

What would `a.get("c") == b.get("c")` return?

value

referentially equal

Reference object equal

Select one:

- a. true, false ✓
- b. false, true
- c. true, true
- d. false, false ✗

Your answer is incorrect.

Both `get()` calls return an `Integer` object representing 130. Since `equals()` is correctly implemented for the (immutable) `Integer` type, it returns `true` for those two values.

The `get()` calls return *distinct* `Integer` objects, so they are not referentially equal. `==` returns `false`.

This is the surprising pitfall: if you have in your mind that the `Map` contains `int` values, you will be surprised by the behavior of `get()`, because it returns an `Integer` instead. Most of the time you can use `Integer` interchangeably with `int`, but not when it comes to equality operators like `==` and `equals`.

The correct answer is: true, false

Question **3**

Not answered

Marked out of 10.00

Here is the code again from the slide Autoboxing and Equality:

```
1.  Map<String, Integer> a = new HashMap<>(), b = new HashMap<>();
2.  a.put("c", 130); // put ints into the map
3.  b.put("c", 130);
```

Now suppose you assign the `get()` results to `int` variables:

```
1.  int i = a.get("c");
2.  int j = b.get("c");
3.  boolean isEqual = (i == j);
```

Is there an error with that code, or if not, what is the value of `isEqual`?

Select one:

- a. true
- b. false
- c. compile error
- d. runtime error

Your answer is incorrect.

The assignments automatically *unbox* the `Integer` objects into `int` values, both 130. Those primitive `int` values are both 130, so `==` now returns `true`.

Behavior differences like this make autoboxing/unboxing bugs hard to spot and easy to introduce. Another reason they can be tricky: if we asked these same questions with **127** instead of 130, the answers would be different! For the integers from -128 to 127, the boxed `Integer` objects come from a pool that is reused every time, and the objects will be `==`.

The correct answer is: true

◄ CPT204 2223 Lab 13 Video Recording

Jump to...

Lab Exercise #13.1 HASet SIZECOMPARATOR ►

Started on	Thursday, 18 May 2023, 22:35
State	Finished
Completed on	Tuesday, 23 May 2023, 16:00
Time taken	4 days 17 hours
Grade	**0.00** out of 300.00 (**0**%)

Question **1**

Incorrect

Mark 0.00 out of 100.00

What kind of ADT operation is the `substring` method of `String`?

Answer: ~~observer~~ producer ✖

The correct answer is: producer

Question **2**

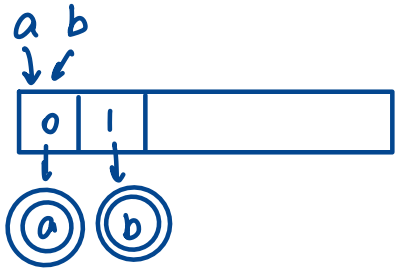
Not answered

Marked out of 100.00

Consider the following code

```
1. List<String> a = new ArrayList<>();
2. a.add("a");
3. List<String> b = a;
4. b.add("b");
5. System.out.println(a);
```

It prints "`[a, b]`" because `a` and `b` are alias ✖ for the same `ArrayList` object.



Question **3**

Not answered

Mark 0.00 out of 100.00

Complete the overridden method **toString**() to print all the (key, element) pairs of an HAMap object as in the test case below:
For example:

Test	Result

`HAMap<String, Integer> map = new HAMap<>();`
`map.put("a", 1);`
`map.put("b", 2);`
`map.put("c", 3);`
`System.out.println(map);`
	{(a,1),(b,2),(c,3)}

Answer: (penalty regime: 0, 15, 30, ... %)

Reset answer

```
1  // MOCK FINAL EXAM 2021
2
3  @Override
4  public String toString() {
5
6
7
8  }
```

Question author's solution (Java):

```
1  // MOCK FINAL EXAM 2021
2
3  @Override
4  public String toString() {
5      String output = "{";
6      for (K key : this) {
7          output = output + "(" + key + "," + get(key) + "),";
8      }
9      return output.substring(0, output.length()-1) + "}";
```

◄ CPT204 2223 Lecture 14 Video Recording

Jump to...

CPT204 2223 Lab 14 ►

CPT204 Hyflex 2021
Final Exam

Overview

This document contains questions for Final Exam. However, the final exam will be given as a Quiz in Learning Mall.

There are five questions with total marks 100 points. All questions are to be answered and submitted within 2 hours.

Question 1. Short Answer Questions (20 points)

Fill in the box with the answer.

1. Consider the following code:
   ```
   String name = null;
   System.out.println(name.toLowerCase());
   ```
   Which kind of checking will it fail? …
   dynamic checking / runtime checking
2. Consider the following method to square a list.
   ```
   public static MyList squareList(MyList list) {
       MyList p = list;
       while (p != null) {
           p.value *= p.value;
           p = p.next;
       }
   return list;
   }
   ```
   The method will also … the input list.
   mutate / change
3. In a Javadoc comment, we use **@param** tag to denote the … in a specification of a method.
   precondition
4. To create our own unchecked exception, we must subclass and extend the class .RuntimeException
5. To allow types such as Integer, String, and user-defined types to be a parameter to methods, classes, and interfaces, we use .generic
   Using it, we can create classes that work with different data types.
6. Write one line of code to call the overridden `toString()` method of the superclass:
   … super .toString();
7. Assume we have 9 items, represented by integers 0 through 8 in a `WeightedQuickUnion` data structure. All items are initially unconnected to each other. Given the following series of `connect(p, q)` operations, where we break ties by connecting p's root to q's root :
   ```
   connect(2, 3);
   connect(1, 2);
   ```

```
connect(5, 7);
connect(8, 4);
connect(7, 2);
connect(0, 6);
connect(0, 8);
connect(6, 7);
```
What is the output of `parent(4)` ? 3

8. If we want to define a class that implements the interface `Iterator<Double>`, we need to define two methods: method `public boolean hasNext()` and what method? Write the method signature.
   …

```
public Double next();
```

9. Consider the following implementations of the `Integer`'s `hashCode()` method:

```
public int hashCode() {
    return 25;
}
```

This is a poor hash code because … will occur all the time.

collision

10. Consider the following code:

```
synchronized (this) {
    this.balance += depositAmt;
}
```

We use … to ensure thread safety of the shared memory.

mutable data

synchronization

Question 2. Linked Data Structure, Generics (20 points)

Complete the method `void insertN(T item, int index, int n)` of `SLList<T>`.

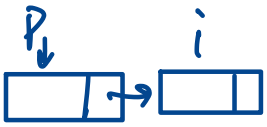
It inserts n copies of item at the given index.

If index is after the end of the list, insert the n new items at the end.

The index is valid position to insert within the list.

Test case 1:

```
SLList<String> list = new SLList<>();
list.addLast("a");
list.addLast("c");
list.insertN("b", 1, 2);
list.print();                  →  a b b c
list.insertN("d", 4, 3);
list.print();                  →  a b b c d d d
```



Question 3. ADT, Encapsulation, Deep Copy (20 points)

Consider the following ADT SynCollection:

```
1  /**
2  * Represents a list of collections of strings
3  * that are synonymous in English,
4  * e.g. {"large", "big", "sizeable"}.
5  * Each collection is considered fixed,
6  * so it never changes once created,
7  * but new collections may be added to this list.
8  */
9  public class SynCollection {
10    public final List<Set<String>> collections;
11
12    /** Make an empty SynCollection */
13    public SynCollection() {
14        this.collections = new ArrayList<Set<String>>();
15    }
16
17    /** Make SynCollection from an existing SynCollection
18    * @param other */
19    public SynCollection(SynCollection other) {
20        this.collections = other.collections;
21    }
22
23    /** Add a new collection of strings
24    * @param newColl set of strings that are synonymous */
25    public void addCollection(Set<String> newColl) {
26        this.collections.add(newColl);
27    }
28
29   /** Get all collections that share a particular word
30   * @param word String to look for
31   * @param result list that receives the collections found
32   * Adds all collections that contain word to the result list. */
33   public void filter(String word, List<Set<String>> result) {
```

shallow copy

deep copy

```
34        for (Set<String> coll : this.collections) {
35            if (coll.contains(word))
36                result.add(coll);
37            }
38        }
39    }
40 }
```

Fill in the box with the answer.

What type of *ADT operation* is the following method ? **(2 points each)**

`SynCollection()` creator

`SynCollection(SynCollection other)` producer

`void addCollection(Set<String> newColl)` mutator

`void filter(String word, List<Set<String>> result)` observer

Complete the statements below regarding the concepts of encapsulation and representation exposure **(2 points each)**

encapsulation

Line 10 breaks …, the `collections` representation field is publicly-accessible. To fix it, we have to make it ….private

mutable

Line 20 exposes the representation by sharing a … list instance between two `SynCollection` objects. What we should do instead it to make a/an … of the `collections` list.

deep copy

3b

Line … exposes the representation by directly adding a set to the result list. What should we do it to … the set before that.

deep copy

Representation exposure:

- immutable data type can have mutable objects in their representation. as long as they don't expose them to clients.
  → x public
- immutable data type : primitive)
  → x defensive copying

x reference directly to mutable array

Question 4. Equality, Inheritance (20 points)

Complete the method **`boolean equals(Object that)`** of an iterable ARDeque that overrides the one in `Object`.

To be the same, they must be of the same size, and must share at most 2 different items at the same position.

Suppose `[]` is an `ARDeque<Integer>`. Then:

```
[1, 2, 3, 4].equals([1, 2, 5, 6])   →  true
[1, 2, 3, 4].equals([1, 4, 2, 3])   →  false
```

Encapsulation

a. access control

public & private

b. variable scope

method parameters

local variable

Question 5. Invariant, Concurrency, Deadlock (20 points)

Given the following `Devil` class:

```
public class Devil {
    private final String name;
    private final String type;
    private final Set<Devil> friends;
    // Invariant:
    // name, type, friends are not null
    // a is friend with b if and only b is friend with a
    // i.e. for all f in friends, f.friends contains this

    public Devil(String name, String type) {
        this.name = name;
        this.type = type;
        this.friends = new HashSet<>();
    }

    public synchronized boolean isFriendWith(Devil that) {
        return this.friends.contains(that);
    }

    public synchronized void addFriend(Devil that) {
        if (this.friends.add(that)) {
            that.addFriend(this);
        }
    }

    public synchronized void remFriend(Devil that) {
        if (this.friends.remove(that)) {
            that.remFriend(this);
        }
    }
}
```

Fill in the box with the answer.

a) Given two `Devil` objects:
   `Devil denji = new Devil("Denji", "Chainsaw");`
   `Devil power = new Devil("Power", "Blood");`
   and two threads, Thread A and Thread B.

Assume that currently the invariant holds.
Give two examples of thread operations that may cause deadlock. **(10 points)**

b) Give two strategies that would fix the deadlock problem above. **(10 points)**

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CPT204 Hyflex 2021
Resit Exam

Overview

This document contains questions for Resit Exam. However, the resit exam will be given as a Quiz in Learning Mall.

There are five questions with total marks 100 points. All questions are to be answered and submitted within 2 hours.

Question 1. Short Answer Questions (20 points)

Fill in the box with the answer.

1. Consider the following code:
```
int[] arr = new int[] { 2, 5, 10 };
arr[2] = "4";
```
Which kind of checking will it fail? …
static checking

2. Consider the following method to double a MyList object.
```
public static MyList doubleList(MyList list) {
    MyList p = list;
    while (p != null) {
        p.value *= 2;
        p = p.next;
    }
return list;
}
```
mutate
The method will also … the input list.

3. In a Javadoc comment, we use **@return** tag to denote the … in a specification of a method.
postcondition

4. A method that throws a checked exception must advertise the exception in the method signature using the keyword …. throws

5. To allow types such as Integer, String, and user-defined types to be a parameter to methods, classes, and interfaces, we use generics.
Using it, we can create classes that work with … data types.
abstract

6. Write one line of code to call the empty constructor of the superclass:
… super();

7. Assume we have 9 items, represented by integers 0 through 8 in a `WeightedQuickUnion` data structure. All items are initially unconnected to each other. Given the following series of `connect(p, q)` operations, where we break ties by connecting p's root to q's root :
```
connect(2, 3);
connect(1, 2);
connect(5, 7);
```

```
connect(8, 4);
connect(1, 5);
```
What is the output of `parent(7)` ? … 3

8. If we want to define a class that implements the interface `Iterator<Integer>`, we need to define two methods: method `public boolean hasNext()` and what method? Write the method signature.
   … public Integer next();

9. Consider the following implementations of the `Integer`'s `hashCode()` method, where `intValue()` simply returns the integer value of the Integer object:
```
public int hashCode() {
    return intValue() * intValue();
}
```
   This is a poor hash code because collisions occur when two integers have the same …. absolute integer value
   For example, 5 and -5 will have the same hash code.

10. Consider the following code:
```
synchronized (this) {
    this.balance -= withdrawAmt;
}
```
   Access to the shared memory `balance` is protected by a/an … mechanism.

Question 2. Linked Data Structure, Generics (20 points)

Complete the method `void insertN(T item, int index, int n)` of `LLDeque<T>`.

It inserts n copies of item at the given index.

If index is after the end of the deque, insert the n new items at the end.

The index is valid position to insert within the deque.

Test case 1:

```
LLDeque<String> deque = new LLDeque<>();
deque.addLast("a");
deque.addLast("c");
deque.insertN("b", 1, 2);
deque.printDeque();              →  a b b c
deque.insertN("d", 4, 3);
deque.printDeque();              →  a b b c d d d
```

Question 3. ADT, Encapsulation, Deep Copy (20 points)

Consider the following ADT DeptCourses:

```
1  /**
2  * Represents a list of set of Course objects
3  * that belong to the same department,
4  * e.g. {CPT105, CPT204, CPT403}.
5  * Each set is considered fixed,
6  * so it never changes once created,
7  * but new sets may be added to the list.
8  */
9  public class DeptCourses {
10    public final List<Set<Course>> courses;
11
12    /** Make an empty DeptCourses */
13    public DeptCourses() {
14        this.courses = new ArrayList<Set<Course>>();
15    }
16
17    /** Make DeptCourses from an existing DeptCourses
18      * @param other */
19    public DeptCourses(DeptCourses courses) {
20        this.courses = other.courses;
21    }
22
23    /** Add a new set of courses
24      * @param newCourses set of courses in a new department */
25    public void addCourses(Set<Course> newCourses) {
26        this.courses.add(newCourses);
27    }
28
29    /** Get all courses of this DeptCourses object
30      * @return the courses in this object */
31    public List<Set<Course>> getCourses() {
32        return this.courses;
33    }
34 }
```

Fill in the box with the answer.

What type of *ADT operation* is the following method ? **(2 points each)**

```
DeptCourses()
DeptCourses(DeptCourses other)
void addCourses(Set<Course> newCourses)
List<Set<Course>> getCourses()
```

creator
producer
mutator
observer

Complete the statements below regarding the concepts of encapsulation and representation exposure **(2 points each)**

Line 10 … breaks encapsulation, the instance variable can be accessed by other classes. To fix it, we have to make the instance variable … private

Line 20 exposes the representation by sharing a … mutable list instance between two `DeptCourses` objects. What we should do instead it to make a/an … of the `courses` list.

alias / reference
deep copy

Line 32 exposes the representation by returning a … to `courses` out of the ADT, making it modifiable by the method caller. What we should do instead is to return a/an … of the `courses` list.

deep copy

Question 4. Equality, Inheritance (20 points)

Complete the method **`boolean equals(Object that)`** of `LLDeque` that overrides the one in `Object`.

To be the same, they must be of the same size, and must share at most 2 different items at the same position.

Suppose `[]` is an `LLDeque<Integer>`. Then:

```
[1, 2, 3, 4].equals([1, 2, 5, 6])   →  true
[1, 2, 3, 4].equals([1, 4, 2, 3])   →  false
```

Question 5. Invariant, Concurrency, Deadlock (20 points)

Given the following DemonSlayer class:

```
public class DemonSlayer {
    private final String name;
    private final Set<DemonSlayer> siblings;
    // Invariant:
    // name, siblings are not null
    // a is sibling of b if and only b is sibling of a
    // i.e. for all s in siblings, s.siblings contains this

    public DemonSlayer(String name) {
        this.name = name;
        this.siblings = new HashSet<>();
    }

    public synchronized boolean isSiblingOf(DemonSlayer that) {
        return this.siblings.contains(that);
    }

    public synchronized void addSibling(DemonSlayer that) {
        if (this.siblings.add(that)) {
            that.addSibling(this);
        }
    }

    public synchronized void remSibling(DemonSlayer that) {
        if (this.siblings.remove(that)) {
            that.remSibling(this);
        }
    }
}
```

Fill in the box with the answer.

a) Given two DemonSlayer objects:
```
DemonSlayer tanjiro = new DemonSlayer("Tanjiro");
DemonSlayer nezuko = new DemonSlayer("Nezuko");
```
and two threads, Thread A and Thread B.

Assume that currently the invariant holds.
Give two examples of thread operations that may cause deadlock. **(10 points)**

b) Give two strategies that would fix the deadlock problem above. **(10 points)**

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