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NUS SCHOOL OF COMPUTING
MIDTERM ASSESSMENT ANSWER SHEET
CS2030S Programming Methodology II

Semester 2 2022/23 Time Allowed 70 Minutes

DO NOT WRITE IN THIS MARGIN

2 / 2 2 / 2 2 / 2 2 / 2

C (2) D (2) D (2) A (2)

1. C 2. D 3. D 4. A

STUDENT NUMBER

A 0258524Y

3 / 3 5. Swappable

intf defn (1)
method sig (1)
return type (1)

```
interface Swappable<S, T>{
  S doSwap(T newToy);
}
```

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6. (a) BlankA: S extends R BlankB: T extends R BlankC: R

2 / 2 (b) BlankD: Object

5 / 5

7. (a) LSP.

Yes, the subclass changes the behavior of superclass object, so the transitive property of "equals" no longer holds. For instance, Point2D a == Point2D b because only their x are same, Point2D b == Point2D c because only their y are the same. Transitive does not hold as a.x == c.x and a.y == c.y are both false

Correctly say it violates LSP (1)
Transitive property (2)
Correct example (2)

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(b) Tell Don't Ask.

No, Point3D calls the super class to construct the x and y variables, and any method involving x, y variables is done by Point2D with the "coordinate" method. Hence Point3D is "telling" Point2D to handle x, y, rather than "asking" for x, y and performing operations itself

Incorrect (0)

8. Can Programs A-D compile and run?

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Program	Compilation Error?	Compilation Warning?	Run-Time Exception?
A	NO	NO	YES
B	YES	YES	N/A
C	NO	NO	YES
D	NO	NO	YES

Still asking for coordinates

DO NOT WRITE
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9. Flexible.

(a) BlankE: ? extends T 2 / 2

(b) BlankF: ? super T 2 / 2

(c) BlankG: T 3 / 3

10. Ah Lian.

(a) BlankH: String BlankI: Object

BlankJ: Object BlankK: String

Correct (4) 4 / 4

(b) BlankL: T BlankM: ?extends T BlankN: ?extends T 5 / 5

BlankO: U BlankP: V

U <: T and V <: T (5)

11. Sumatra.

The problem is that there is no longer a point in overload. The point of overloading is to allow us to write methods to handle different inputs. For instance if we want to handle something that is only in subclass B, we cannot do so anymore as its compile time type is now A. For example void f(A a){ A x = new A(); a = x;} will also result in run time error as you try to cast x which is type A to a (the input param) which has run-time type B. This is narrowing type conversion and will not work. Compiler can't detect error as its compile time type is A.

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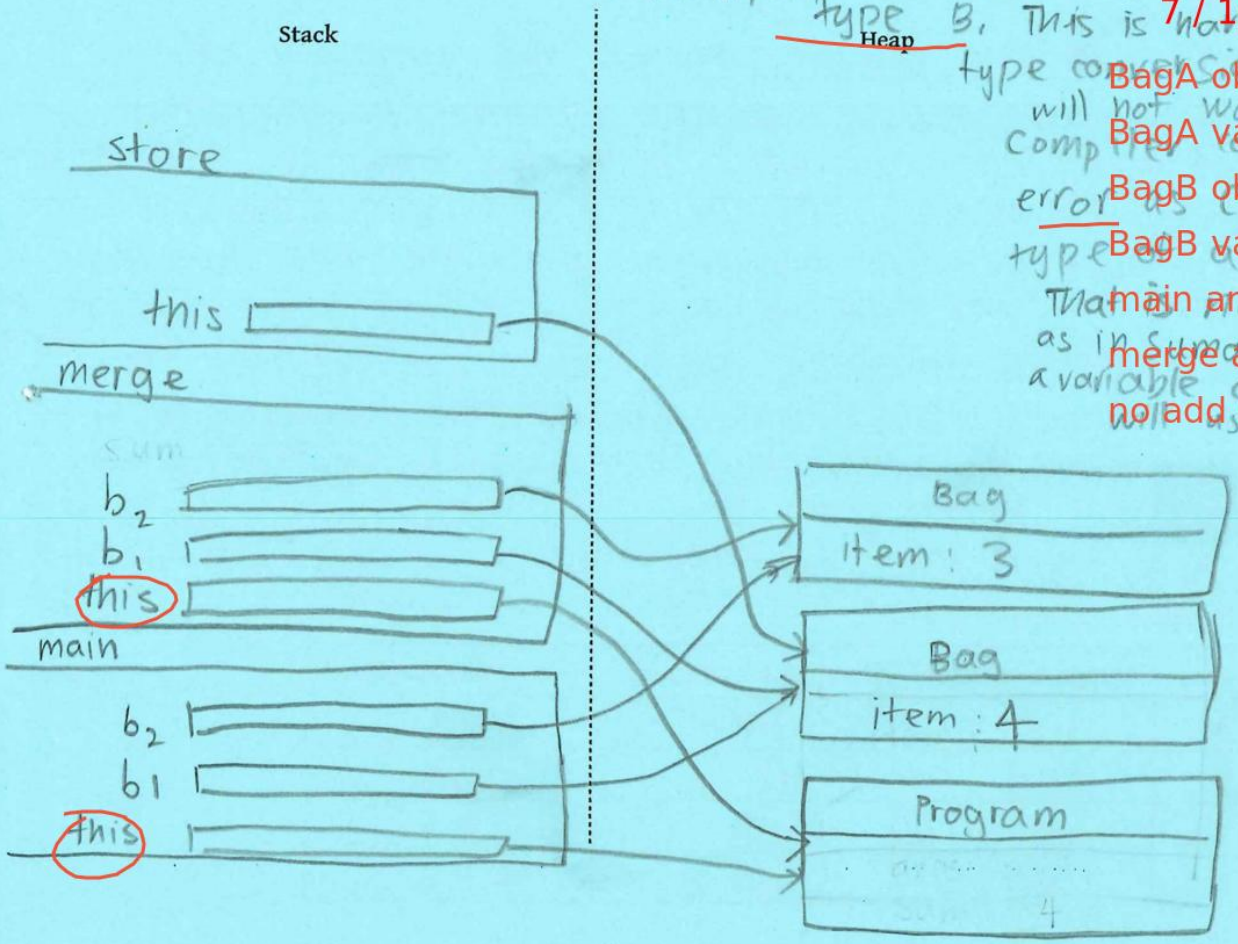
Problem stated correctly (1)

Conceptual error (-1)

12. Stack and Heap.



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BagA obj (1)

BagA value (1)

BagB obj (1)

BagB value (1)

main arrows (1)

merge arrows (1)

no add sf / obj (1)