Started on	Wednesday, 1 February 2023, 09:18
State	Finished
Completed on	Wednesday, 1 February 2023, 10:20
Time taken	1 hour 2 mins
Marks	7.50/13.00
Grade	**5.77** out of 10.00 (**58%**)

Question **1**

Correct

Mark 1.00 out of 1.00

Which of the following is different from the set {2, 3}?

Select one:

- ⦿ {2} ∩ {3}   ✓
- ○ {2} ∪ {3}
- ○ {2, 2, 3}
- ○ {3, 2}

Your answer is correct.

The correct answer is: {2} ∩ {3}

Question **2**

Incorrect

Mark 0.00 out of 1.00

Which of the following is an element of (∈) {9, 2, 7} ?

Select one:

- ○ 9
- ⦿ 1   ✗
- ○ {9, 2}
- ○ {9, 2, 7}

Your answer is incorrect.

The correct answer is: 9

Question **3**

Correct

Mark 1.00 out of 1.00

Which of the following is a proper subset (⊂) of {9, 2, 7} ?

Select one:

- ○ 9
- ○ 1
- ◉ {9, 2}   ✓
- ○ {9, 2, 7}

Your answer is correct.

The correct answer is: {9, 2}

Question **4**

Correct

Mark 1.00 out of 1.00

Which of the following is a subset (⊆) of of {9, 2, 7}, but not a proper subset (⊂) ?

Select one:

- ○ 9
- ○ 1
- ○ {9, 2}
- ◉ {9, 2, 7}   ✓

Your answer is correct.

The correct answer is: {9, 2, 7}

Question **5**

Correct

Mark 1.00 out of 1.00

Which set is described by the rule {x: x < 6, x is a positive integer}?

Select one:

- ○ {..., −3, −2, −1, 0, 1, 2, 3, 4, 5}
- ○ {0, 1, 2, 3, 4, 5}
- ◉ {1, 2, 3, 4, 5}   ✓

Your answer is correct.

The correct answer is: {1, 2, 3, 4, 5}

Question **6**

Correct

Mark 1.00 out of 1.00

Which of the following statements is true?

Select one:

○ {2, 4} ∈ {2, 4, 6}

◉ ∅ ⊆ {2, 4, 6} ✓

○ 2 ⊆ {2, 4, 6}

○ {2, 4, 6} ⊂ {2, 4, 6}

○ $\{2\} \in \{2, 4, 6\}$

Your answer is correct.

The correct answer is: ∅ ⊆ {2, 4, 6}

Question **7**

Partially correct

Mark 0.50 out of 1.00

Which of the following sentences are true for any instance of Union-Find?

∀ = "for all" / "for any" ∃ = "there exists"

Select one or more:

☑ ∀ components, ∃ exactly one element which refers to itself ✓

☐ ∀ elements, ∃ exactly one element which refers to itself

☐ ∀ components, ∃ at least one element which refers to itself

☐ ∀ elements, ∃ at least one element which refers to itself

☐ ∀ elements, ∃ no elements which refers to itself

☐ ∀ components, ∃ no elements which refers to itself

☐ ∀ elements, ∃ another element which refers to it

☑ ∀ elements, ∃ a component it belongs to ✓

Your answer is partially correct.

You have correctly selected 2.

The correct answers are: ∀ components, ∃ exactly one element which refers to itself, ∀ components, ∃ at least one element which refers to itself, ∀ elements, ∃ at least one element which refers to itself, ∀ elements, ∃ a component it belongs to

Question **8**

Incorrect

Mark 0.00 out of 1.00

Give the value printed by the following code fragment:

Java:

```java
int sum = 0;
for (int i = 1; i < 1000; i++)
    for (int j = 0; j < i; j++)
        sum++;
StdOut.println(sum);
```

Python:

```python
sum = 0
i = 1
while i < 1000:
    j = 0
    while j < i:
        sum += 1
        j += 1
    i +=1
print(sum)
```

Choices bellow are formatted with _ as thousands separator.

Select one:

○ a. 499_500

○ b. 500_500

● c. 1_000_000   ✕

○ d. 1_000

○ e. 10_000

Your answer is incorrect.

The correct answer is: 499_500

Question **9**

Incorrect

Mark 0.00 out of 1.00

Give the value printed by the following code fragment:

Java:

```
int sum = 0;
for (int i = 1; i < 1000; i *= 2)
    for (int j = 0; j < 1000; j++)
        sum++;
StdOut.println(sum);
```

Python:

```
sum = 0
i = 1
while i < 1000:
    j = 0
    while j < 1000:
        sum += 1
        j += 1
    i *=2
print(sum)
```

Choices bellow are formatted with _ as the thousands separator.

Select one:

○ 10_000

◉ 1_000   ✕

○ 100_000

○ 1_000_000

Your answer is incorrect.

The correct answer is: 10_000

Question **10**
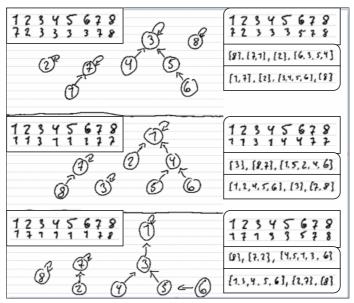
Correct

Mark 1.00 out of 1.00

What does the following code fragment print?

Java:

```
String string1 = "hello";
String string2 = string1;
string1 = "world";
StdOut.println(string1 + " " + string2);
```

Python:

```
string1 = "hello"
string2 = string1
string1 = "world"
print(string1 + " " + string2)
```

Select one:

- ⦿ a.   world hello   ✓

- ○ b.   hello world

- ○ c.   hello hello

- ○ d.   world world

Your answer is correct.

The correct answer is: world hello

Question **11**

Correct

Mark 1.00 out of 1.00

Below is a drawing of three union-find instances, and 12 descriptions of a union-find instance represented in either set notation, or as id[] arrays as a result of either the quick find or quick union implementations of union-find. Drag these 12 descriptions to the drawing of a union-find instance, which they fit. The categories are colour-coded as follows: White: Quick-find Blue: Quick-union Grey: "Ordered" Set Purple: "Disordered" Set

Your answer is correct.

Question **12**

Incorrect

Mark 0.00 out of 1.00

Estimate the minimum amount of time that would be required for **quick-find** to solve a dynamic connectivity problem with 10^9 sites and 10^6 input pairs, on a computer capable of executing 10^9 instructions per second. Assume (1) that each iteration of the for loop in *union()* requires, at minimum, 10 machine instructions; and (2) that every *union()* operation connects two hitherto unconnected components.

Note: underscore separate thousands, dots denote decimals.
All answers below have, at most, two non-zero decimals.

Select one:

○ 115.74 days

◉ 7.6 years   ✕

○ 11.57 days

○ 1.7 minutes

○ 0.017 seconds

○ 17.28 minutes

○ 0.24 seconds

Your answer is incorrect.

The correct answer is: 115.74 days

Question **13**

Incorrect

Mark 0.00 out of 1.00

Repeat exercise 1.5.5 for **weighted quick-union**:

Estimate the minimum amount of time that would be required for **weighted quick-union** to solve a dynamic connectivity problem with 10^9 sites and 10^6 input pairs, on a computer capable of executing 10^9 instructions per second. Assume (1) that each connection in *union()* requires, at minimum, 10 machine instructions; and (2) that every *union()* operation connects two hitherto unconnected components.

Note: underscore separate thousands, dots denote decimals.
All answers below have, at most, two decimals.

Select one:

○ 115.74 days

○ 7.6 years

○ 11.57 days

○ 1.7 minutes

○ 0.017 seconds

◉ 17.28 minutes   ✕

○ 0.24 seconds

Your answer is incorrect.

The correct answer is: 0.24 seconds