

**CS302 2015 Midterm – Answer Sheet**

Name: \_\_\_\_\_

Email: \_\_\_\_\_@vols.utk.edu

**Question 1 :**

A: \_\_\_\_\_ B: \_\_\_\_\_ C: \_\_\_\_\_

D: \_\_\_\_\_ E: \_\_\_\_\_ F: \_\_\_\_\_

**Question 2 –** Use the following multiple choice answers and circle the correct answer:

- |                |                  |                       |                    |
|----------------|------------------|-----------------------|--------------------|
| a: $O(1)$      | g: $O(n^2)$      | m: $O(mn^2)$          | s: $O(n) + O(m)$   |
| b: $O(\log n)$ | h: $O(m^2)$      | n: $O(m^2n)$          | t: $O(n) + O(m^2)$ |
| c: $O(\log m)$ | i: $O(n \log n)$ | o: $O(m^2n^2)$        | u: $O(n^2) + O(m)$ |
| d: $O(n)$      | j: $O(m \log m)$ | p: $O(n^m)$           | v: $O(n!)$         |
| e: $O(m)$      | k: $O(n \log m)$ | q: $O(n) + O(\log m)$ | w: $O(2^n)$        |
| f: $O(mn)$     | l: $O(m \log n)$ | r: $O(m) + O(\log n)$ | x: $O(m^n)$        |

- |           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <b>A:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>B:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>C:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>D:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>E:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>F:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>G:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>H:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>I:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>J:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>K:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>L:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>M:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>N:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |
| <b>O:</b> | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x |

**Question 3**

- A-1:** yes no  
**A-2:** yes no  
**A-3:** yes no  
**A-4:** yes no

**Part B:**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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**Part C:**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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**Question 4 –** Circle all lines that are printed in the given sorting algorithm:

**Selection:**    a b c d e f g h i j k l m n o p q r s t u v w x y z  
**Insertion:**    a b c d e f g h i j k l m n o p q r s t u v w x y z

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## Question 5:

Your implementation:

```
#include <vector>
#include <iostream>
using namespace std;
```

```
class Disjoint {
public:
    Disjoint(int nelements);
    int Union(int s1, int s2);
    int Find(int element);
protected:
    vector <int> links;
    vector <int> ranks;
};
```

```
int Disjoint::Find(int element)
{
```

```
}
```

Running time of **Find()**:

```
int Disjoint::Union(int s1, int s2)
{
```

```
}
```

Running time of **Union()**:

```
Disjoint::Disjoint(int nelements)
{
```

```
}
```

Running time of constructor:

## Question 6:

```
long long two_ks(int K, long long S)
```

```
{
```

```
}
```