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Started on	Tuesday, 7 March 2023, 08:34
State	Finished
Completed on	Tuesday, 7 March 2023, 08:35
Time taken	42 secs
Marks	9.00/9.00
Grade	10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

What value is associated with the key "Hello" after executing the following code?

```
ST<String, Integer> st = new ST<String, Integer>();  
st.put("Hello", 12);  
st.put("World", 21);  
st.put("Hello", 49);
```

Select one:

- ☐ 12
- ☐ Both 12 and 49
- ☐ Either 12 or 49, depending on the implementation
- ☒ 49
- ☐ 21



Your answer is correct.

The correct answer is: 49

Question 2

Correct

Mark 1.00 out of 1.00

The following implementation of getting a hashcode is legal:

Java:

```
public int hashCode ()  
{ return 17; }
```

Python:

```
def __hash__(self):return 17
```

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Question 3

Correct

Mark 1.00 out of 1.00

Suppose we implement a symbol table with an ordered array. What is the maximum number of array accesses needed to search for a key in such a symbol table?

Select one:

- ☐ Constant
- ☐ Linear
- ☐ Linearithmic
- ☒ Logarithmic ✓

Your answer is correct.

The correct answer is: Logarithmic

Question 4

Correct

Mark 1.00 out of 1.00

What is the final sequence produced by SequentialSearchST when the keys E A S Y Q U E S T I O N are inserted? Each key's value is the index of the character (e.g. value of key E = 0).

Select one:

- ☐ E|0 -> A|1 -> S|2 -> Y|3 -> Q|4 -> U|5 -> T|8 -> I|9 -> O|10 -> N|11
- ☐ E|6 -> A|1 -> S|7 -> Y|3 -> Q|4 -> U|5 -> T|8 -> I|9 -> O|10 -> N|11
- ☒ N|11 -> O|10 -> I|9 -> T|8 -> U|5 -> Q|4 -> Y|3 -> S|7 -> A|1 -> E|6 ✓
- ☐ N|11 -> O|10 -> I|9 -> T|8 -> U|5 -> Q|4 -> Y|3 -> S|2 -> A|1 -> E|0

Your answer is correct.

The correct answer is:

N|11 -> O|10 -> I|9 -> T|8 -> U|5 -> Q|4 -> Y|3 -> S|7 -> A|1 -> E|6

Question 5

Correct

Mark 1.00 out of 1.00

How many compares are done by SequentialSearchST when the keys E A S Y Q U E S T I O N are inserted?

Select one:

- ☐ a. 144
- ☐ b. 12
- ☐ c. 52
- ☐ d. 86
- ☒ e. 55 ✓
- ☐ f. 32

Your answer is correct.

The correct answer is: 55

Question 6

Correct

Mark 1.00 out of 1.00

What is the final sequence produced by BinarySearchST when the keys E A S Y Q U E S T I O N are inserted? Each key's value is the index of the character (e.g. value of key E = 0).

Select one:

- ☒ | A | E | I | N | O | Q | S | T | U | Y |

| 1 | 6 | 9 | 11 | 10 | 4 | 7 | 8 | 5 | 3 |
- ☐ | A | E | I | N | O | Q | S | T | U | Y |

| 0 | 1 | 2 | 4 | 3 | 5 | 6 | 9 | 10 | 11 |
- ☐ | Y | U | T | S | Q | O | N | I | E | A |

| 3 | 5 | 8 | 2 | 4 | 10 | 11 | 9 | 0 | 1 |
- ☐ | Y | U | T | S | Q | O | N | I | E | A |

| 11 | 10 | 9 | 6 | 5 | 3 | 4 | 2 | 1 | 0 |
- ☐ | A | E | I | N | O | Q | S | T | U | Y |

| 10 | 6 | 8 | 5 | 9 | 4 | 7 | 2 | 1 | 0 |
- ☐ | Y | U | T | S | Q | O | N | I | E | A |

| 3 | 5 | 8 | 7 | 4 | 10 | 11 | 9 | 6 | 1 |
- ☐ | A | E | I | N | O | Q | S | T | U | Y |

| 1 | 0 | 9 | 11 | 10 | 4 | 2 | 8 | 5 | 3 |

Your answer is correct.

The correct answer is:

| A | E | I | N | O | Q | S | T | U | Y |

| 1 | 6 | 9 | 11 | 10 | 4 | 7 | 8 | 5 | 3 |

Question 7

Correct

Mark 1.00 out of 1.00

How many compares are done by BinarySearchST when the keys E A S Y Q U E S T I O N are inserted?

Select one:

- ☒ 38
- ☐ 43
- ☐ 52
- ☐ 11



Your answer is correct.

The correct answer is: 38

Question 8

Correct

Mark 1.00 out of 1.00

Which of the following scenarios leads to expected linear running time for a random search hit in a linear-probing hash table?

Select one:

- ☐ All keys hash to an even-numbered index
- ☐ All keys hash to different indices
- ☒ All keys hash to the same index
- ☐ All keys hash to different even-numbered indices



Your answer is correct.

The correct answer is: All keys hash to the same index

Question 9

Correct

Mark 1.00 out of 1.00

Consider the following key insertions into an initially empty symbol table:

P R O B I N A T O R

Relate a symbol table implementation to an outcome of inserting the above keys. Each key's value is the index of the character (e.g. value of key P = 0).

For hashing, use the following function: $c \% m$, where c = given character's position in the alphabet ($A = 1, B = 2, \dots, Z = 25$), and $m = 13$ e.g. $\text{hash}(D) = 4 \% 13 = 4$

T|7 -> A|6 -> N|5 -> I|4 -> B|3 -> O|8 -> R|9 -> P|0

Sequential Search ✓

A	B	I	N	O	P	R	T
6	3	4	5	8	0	9	7

Binary Search ✓

```

st
| 0 | -> null
| 1 | -> A|6 -> N|5
| 2 | -> B|3 -> O|8
| 3 | -> P|0
| 4 | -> R|9
| 5 | -> null
| 6 | -> null
| 7 | -> T|7
| 8 | -> null
| 9 | -> I|4
|10| -> null
|11| -> null
|12| -> null

```

Separate Chaining ✓

0	1	2	3	4	5	6	7	8	9	10	11	12
null	N-5	O-8	P-0	R-9	B-3	A-6	T-7	null	I-4	null	null	null

Linear Probing ✓

Your answer is correct.

The correct answer is:

Consider the following key insertions into an initially empty symbol table:

P R O B I N A T O R

Relate a symbol table implementation to an outcome of inserting the above keys. Each key's value is the index of the character (e.g. value of key P = 0).

For hashing, use the following function: $c \% m$, where c = given character's position in the alphabet ($A = 1, B = 2, \dots, Z = 25$), and $m = 13$ e.g. $\text{hash}(D) = 4 \% 13 = 4$

T 7 -> A 6 -> N 5 -> I 4 -> B 3 -> O 8 -> R 9 -> P 0
--

[Sequential Search]

	A		B		I		N		O		P		R		T	

	6		3		4		5		8		0		9		7	

[Binary Search]

st																
	0		-> null													
	1		-> A 6 -> N 5													
	2		-> B 3 -> O 8													
	3		-> P 0													
	4		-> R 9													
	5		-> null													
	6		-> null													
	7		-> T 7													
	8		-> null													
	9		-> I 4													
	10		-> null													
	11		-> null													
	12		-> null													

[Separate Chaining]

	0		1		2		3		4		5		6		7		8		9		10		11		12		

	null		N-5		O-8		P-0		R-9		B-3		A-6		T-7		null		I-4		null		null		null		

[Linear Probing]